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THE LIBYAN OASIS OF KHARGA

BY

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A hundred miles west of the Nile valley, in the latitude of Luxor, the barren plateau of Libya is broken by a string of depressions containing oases. Formerly they could be reached only by a slow camel-journey of four or five days across a scorching and well-nigh waterless stretch of verdureless upland, sometimes among sand dunes, but chiefly over broad expanses of rough limestone from 1,000 to 1,800 feet above the sea. To-day a railroad has been built and the journey can be made in a few hours. Among the oases perhaps the most interesting is that of Kharga, lying 400 miles south of the Mediterranean Sea. In approaching it over the dry plateau one suddenly finds himself at the top of a line of cliffs, from 600 to 1,000 feet high, running north and south. At their foot lies the oasis, a poor, desolate place, which yet seems fruitful because it is not utter desert.

Kharga is a depression about 115 miles long, from north to south and from 12 to 50 miles wide east and west. It is narrowest at the south, but toward the north it expands and sends off a branch to Dakhla, another oasis, lying 90 miles to the west. On the east and north sides of the Kharga depression, steep cliffs form a comparatively straight border; on the west and south, however, there is no definite border, and the land rises gently to the surrounding desert. The reason for the existence of cliffs to the north and east, but not to the south and west, is that the cretaceous and tertiary strata of which the country is composed dip toward the east and north. Dur-

ing the long process of erosion the softness of certain strata has allowed them to be worn back along the plane of the dip, leaving the underlying hard strata to form the floor of the depression, in most places, and causing the formation of cliffs where hard overlying strata have been undermined. No one knows exactly what has become of the material which has been removed in making the depression. Perhaps it has been blown away by the wind; or possibly at some former period streams flowed to the ocean, although at present the depression has no outlet and appears to be surrounded on every side by high land.

The floor of the depression of Kharga is a large, irregular plain from 100 to 400 feet above the sea. It is broken here and there by isolated mesas, flat-topped remnants of the limestone which forms the cliffs. It is also diversified by occasional long bands of sand a mile or two wide, having a trend from north-northwest to south-southeast, at right angles to the prevailing trade-winds which pile the sand into dunes. Somewhat to the east of the center of the depression lies a string of oases and villages extending about 75 miles north and south and divided into a northern group, with Kharga as its center, and a southern group centering around Beris. The villages are poverty-stricken places with flat-roofed houses of adobe, built low and close together. The narrow, crooked streets often run beneath thick arched roofs of mud, built apparently to furnish protection from the intense heat of the summer sun. Around the villages, palm orchards and gardens are carefully irrigated by means of 200 or 300 artesian wells. The rest of the floor of the depression is diversified by patches of tamarisks or reeds in the swampy areas due to the surplus water of the wells, or by drier tracts sparsely clothed with the prickly acacia tree, and the wild Doum palm notable for peculiar branching trunks.

Although the depression of Kharga probably has an area of 25,000 or 30,000 square miles, the population, which is of Arabic origin, amounts to only about 8,500. The number of inhabitants depends entirely upon the supply of water available for irrigation. All the water is derived from artesian wells, for which Kharga has been noted from time immemorial. Some wells which still flow strongly are supposed to have existed for 2,000 or 3,000 years; others of ancient date have dried up; while many flow but feebly. During the last fifty years several score of new wells have been dug, and considerable areas have been added to the districts where cultivation is possible, but the major part of the water supply still comes from wells

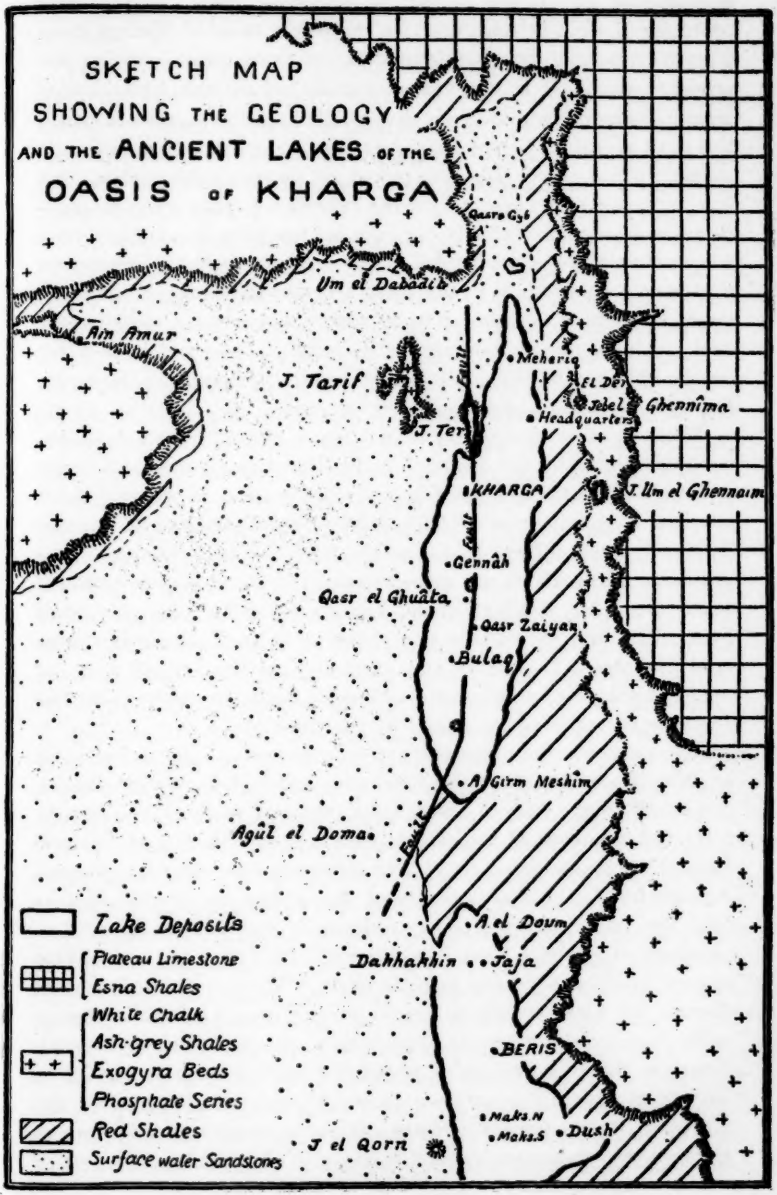

FIG. 1.

From "An Egyptian Oasis."

dug as long ago as the Roman or Byzantine period, in the early centuries of the Christian era. In the whole oasis of Kharga there does not appear to be a single natural source of water—nothing but artesian wells. It is not known exactly where the water comes from. Its immediate source is the so-called artesian sandstone which lies at an average depth of about 125 feet. Far away in the swampy regions of the upper Nile this sandstone comes to the surface, and it is supposed that the water of the Nile River sinks into the sandstone and percolates slowly through it, reaching the surface only when artificial wells are pierced in the overlying layer of impervious limestone. In addition to the main artesian sandstone, there is an upper stratum of the same type in which also artesian wells can be sunk. This comes to the surface in certain places and in it water can be obtained by digging to slight depths. Oftentimes, however, the water is saline and not good for irrigation.

The preceding description of Kharga is drawn from a book recently published by Mr. Beadnell of the Egyptian Geological Survey, and entitled "An Egyptian Oasis." The book is noteworthy as a consistent and scientific description of a region of unusual interest. It is truly geographical in distinction from the many so-called geographical books which are mere accounts of travel and of personal adventures. Mr. Beadnell knows Kharga better than does any other living man, and his volume is crowded with facts which are absolutely reliable. So clearly and carefully are they stated that the reader is able to draw his own conclusions, some of which may differ from, or be additional to, those of the author.

The purpose of the present article is to take the facts furnished by Mr. Beadnell and to see what they indicate as to the climatic conditions of the Libyan desert in the historic past. He makes no reference whatever to the subject except to say that in pre-historic times the climate must have been much moister than at present. Apparently, he has not considered the matter, or else accepts as final the statement of certain members of the Meteorological Department of Egypt to the effect that the Nile Valley has suffered no change in climate during historic times. This is not the place to discuss the water supply of Egypt, which depends upon the climate of the equatorial regions far to the south. It must be borne in mind, however, that the climate of equatorial regions may be subject to variations very different from those of sub-tropical countries like Egypt, or it may remain uniform while that of climatic belts farther to the north undergoes marked variations. Kharga and the rest of

the deserts of northern Africa must be examined upon their own merits.

The importance of the question of changes of climate is evident from the number of articles which have appeared on the subject during the past five years. Its present status may be judged from the recently published work of various authors. For instance, among Europeans, Woiekof, a Russian who has made extensive studies of the fluctuations of the Sea of Aral and of other Asiatic lakes, is strongly of the opinion that there is no evidence of any important change during the last 3,000 years. All the facts appear to him to point merely to changes which have a period of, at most, a few decades and which have never departed far from the mean conditions of the past century. On the other hand, Hann, the greatest living authority upon climate, comes to quite a different conclusion. In the second edition of his great work upon climate, published in 1897, he discussed periodic variations of climate, such as the 35-year cycles of Bruckner, but came to no conclusion as to climatic variations of longer periods. In his last edition, published in 1908, he says that in view of recent studies in central Asia, "we can scarcely doubt any longer that we have in these districts a general dessication which is still in progress." He goes on to say, "How far in all these accounts we have to do with a progressive dessication and how far with climatic oscillation, is still uncertain." Holdich, one of the foremost English authorities upon central Asia, says that no one will dispute the evidence of dessication, but he can "see at present no evidence" of great oscillations. In America, Ward, Abbe, and other meteorologists agree with Woiekof that the only changes in climate during historic times are those of short period and small amplitude. Bowman, and Moreno, on the other hand, have shown that in South America there is strong evidence indicating that during long periods since the occupation of that country by man the climate has been distinctly moister than during the past century.

Few places offer better opportunities than Kharga for testing the various theories as to climatic changes. The first stage in the recent climatic history of the oasis appears to be recorded in the so-called lake deposits described by Beadnell. They occupy the greater part of an area some 85 miles long and five to ten miles wide at the foot of the cliffs which bound the oasis on the east. Beadnell describes them as consisting "of horizontal, finely-bedded alternations of sand and clay, or more frequently of an intimate mixture of the two; local false-bedding is not uncommon, and included fragments

of limestone and sandstone are occasionally met with. The beds have a prevailing brown tint and frequently exhibit well-marked hexagonally disposed shrinkage cracks. Although originally they must have formed an immense, compact and continuous sheet, the deposits have since been subjected to considerable denudation, so that at the present day they exist as large isolated patches" (p. 111). Among the deposits some fragments of pottery were found firmly embedded in clay and also fresh-water shells of *Melania* and *Limnaea*.

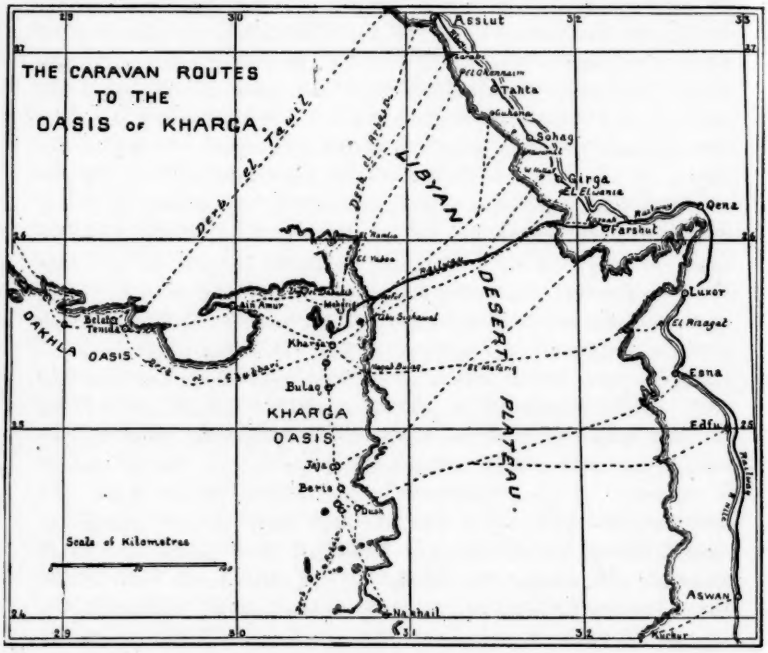

FIG. 2.
From "An Egyptian Oasis."

The upper portion of the clays lies at an altitude which varies from 66 to 83 meters above sea level. Beadnell concludes that "while the lake presumably at one time reached to a maximum level of 85 meters, it stood for a considerable period at about 70 meters above sea level" (p. 116). He believes "that the depression was inhabited previous to the formation of the lake" (p. 116). "The evidence [of this] is .... the discovery of a portion of an earthenware

pipe imbedded *in situ* in the lake clays at a height of 42.85 meters, of the type used by the ancients for lining their water channels" (p. 120).

In explanation of the supposed lake or lakes in which these deposits were laid down, Beadnell suggests two hypotheses. The first is that when artesian wells were first bored, the water-bearing sandstones were so highly charged with water that the wells overflowed in great volume and formed lakes. The second hypothesis is a modification of the first. It supposes that the lakes were formed when the process of natural erosion first exposed the upper artesian sandstone and thereby allowed water to escape. Neither hypothesis is satisfactory. As Beadnell points out, the flow from a new well is at first rapid, but soon shows a marked decline, and finally settles down to a fairly steady flow, or to a flow which decreases at a constantly diminishing rate. If the discharge from the wells first drilled had been so great as completely to flood the immediately surrounding area, it is scarcely to be supposed that other wells would at once have been constructed. A single well or a dozen wells could not possibly have supplied water sufficient to balance the evaporation of a lake 85 miles long and from five to ten miles wide unless the head of water were scores or hundreds of times as great as it is to-day. The proof of this is found in the fact that the water of the 300 wells, more or less, now in operation, is evaporated from an area not a tithe as great as that of the supposed old lake. Let us assume that as many as twenty wells were dug at the very beginning, and that the evaporation from the surface was four feet per year, which is less than from the Salton Sea under climatic conditions similar to those of Libya. In order to maintain the lake at a constant level, each well would have had to discharge 240 times as much water as the average well of to-day. This would require a tremendous head of water. There is no reason to believe that the head in early days was much greater than at present; for at the depth where the artesian sandstone lies, all rocks in practically all parts of the world are saturated with water. They were saturated in early days and they are saturated to-day, except in the areas immediately surrounding the wells. Under conditions of complete saturation the head of water both in the past and in the present depends in part upon the height at which the water enters the rock and in part upon the amount of pressure exerted by the over-lying strata. These factors must have been essentially the same in the past as in the present.

As to the formation of the lakes according to the second hypothesis, it is sufficient to note one insuperable objection. When natural erosion first exposed the upper artesian sandstones, the topography must have been quite different from that of to-day, for at present the sandstones are exposed for many miles. The lake deposits, however, so far as can be judged, were laid down upon a topography very similar to that now prevailing.

It seems probable that only part of the deposits under discussion were formed in lakes. The nature of terrigenous as opposed to marine deposits, and of subaerial as opposed to lacustrine deposits has only recently been made clear by such men as Davis and others. Barrell has discussed the matter fully,* and has shown that the presence of shrinkage cracks, such as those described above, is a sure indication of subærial rather than lacustrine deposition. The other characteristics of the deposits, such as finely bedded alternations of sand and clay and local false-bedding are also more likely to occur in subærial than in lacustrine strata. Moreover the finding of fresh water shells, such as *Limnaea,* is not consonant with the existence of a lake. If a lake existed here, it is safe to say that it must have been salt, because, in the first place, it would have had no outlet unless it rose higher than the limit of 85 meters indicated by the upper deposits; and, in the second place, it must have existed a long time,—long enough to lay down sediments which appear to have a thickness of a hundred feet. If it had been salt, fresh water shellfish could not have inhabited it. Finally, the finding in the lake deposits not only of pottery at various levels, sometimes 40 meters below the upper deposits, but also of Neolithic flints which appear to have come from the middle clays, indicates that at various periods man lived upon the very areas where deposition took place. Altogether, the facts seem to indicate that a considerable portion of the deposits was laid down on the alluvial fans of streams flowing in from the surrounding plateau, or else in playas and swamps. If a lake actually existed, as seems highly probable, it was quite small at the time when the subærial deposits were laid down. At other times, however, during periods of relatively heavy rainfall, it may have expanded greatly. Such an expansion may account for the fact that Paleolithic implements are found only on the edges of the depression. Before Neolithic man appeared the lake may have contracted so that a part of the floor of the depression became habitable. Still later the water may have risen again, which may

* *Journ. of Geol.*, Vol. 14, pp. 524 ff., 568 ff.

account for the fact that the Neolithic flints are deeply buried. Finally the lake may have retreated once more during the Græco-Roman period in accordance with the conclusion of Beadnell quoted on a later page. In the absence of a series of exact sections showing the succession of beds in the mingled lacustrine and subærial deposits, it is impossible to come to any exact conclusion in the matter. The suggestions here made, however, show that further study of Kharga may give us a full record of climatic pulsations from Paleolithic times to the present.

Whatever may have been the size of the lake, whether large or small, and whatever may be the proportion of alluvial deposits, the facts point clearly to climatic conditions different from those now existing. At present alluvial deposition is not taking place, but on the contrary, erosion is in progress. The nearest approach to lakes is now a few small swamps. If the rainfall of past times were such as to cause streams of sufficient size to flow down from the plateau during the winter, the conditions of both alluvial and lacustrine deposition would prevail. Evidently, some such conditions prevailed during the time when the flints and pottery were deposited. We cannot date the flints, but, as Beadnell says: (p. 118) "The types [of pottery] do not differ in any important respect from those associated with the towns and cemeteries of Græco-Roman age in many parts of the oasis. . . . The pottery, therefore, bears out our conclusions that the lake continued to exist well into the historic period." While there is room for question as to the nature of the deposits in which the pottery is found, we can scarcely question that the climatic conditions which made their deposition possible did continue into the historic period.

In connection with the existence of an ancient lake or of streams which formed large deposits, some notice should be taken of the springs of Kharga. At the present time, as Beadnell tells us, there is no natural efflux of water anywhere in the depression. On the border, however, there are one or two small springs such as Ain Amur, which once supported small settlements, but are now mere water holes. In ancient times the case was different. "The existence of thick deposits of calcareous tufa on the upper portions of the cliffs of the depression suggests a considerable outpouring of water from springs" (p. 112). It is safe to assume that there must have been springs on the floor of the oasis also. We can scarcely suppose that the first drillers of wells were so far advanced in science and art that they sunk wells at points where there was no

flow of water. Moreover, if there were springs high up near the top of the cliffs there must have been others lower down. The reason why there is to-day no natural efflux of water in the oasis proper is probably that all the natural sources were early converted into artesian wells. It is interesting to note that all the ancient wells are called *Ain,* which means in Arabic *spring,* while those of modern construction are called *Bir,* which is the common word for *well.* The explanation of this nomenclature may be that the original wells were built where springs were located, but it is equally possible that when the Arabs came to Kharga they found numerous flowing wells and called them springs, not realizing that they were artificial.

The earliest settlers in Kharga certainly did not use artesian wells. Neither palæolithic nor neolithic man was sufficiently skilled to make use of subterranean sources of water. Devoid of all iron tools, as these early people were, they cannot possibly have dug into the solid rock. Their wells must have been mere shallow holes in the soft sand or clay. Nevertheless, primitive man lived in large numbers in Kharga, as is proved by an abundance of flint implements. The palæolithic implements are found chiefly on the edges of the oasis and upon the surrounding plateau, which, as has already been said, suggests that in the earliest days of man the center of the oasis was a lake or swamp, and hence uninhabitable. It suggests also that regions outside the oasis,—districts which are now absolute desert—were then habitable. It is probable that palæolithic man drank from springs which now have disappeared, but whose deposits of tufa still lie upon the upper cliffs.

Turning now to the vicissitudes of Kharga during strictly historic times, we find that in the past the population was much more dense than it is now. A few quotations from Beadnell will show his opinion upon the matter.

"One frequently hears it stated that the oases were far more thickly populated and better watered in olden times than at the present day. This belief is based on the existence in many parts of the depression of extensive remains of temples, forts, and villages, on the widespread traces of formerly cultivated lands, and on the abundance of sanded-up wells. It must not, however, be forgotten that the remains in question belong to successive generations, and that there is as yet no evidence to enable us to determine how much of the land, or how many of the wells, were in use at one and the same time. The evidence is, however, sufficiently pronounced

to justify the conclusion that under the Romans the oasis of Kharga was far more flourishing than in modern times, a large part of the population being engaged, not in agriculture but in mining, boring, and in the excavation of subterranean aqueducts" (pp. 156-157) ... "The inhabitants [at the present day, as apparently in the past also] rely almost entirely for subsistence on the products they are able to raise by their own toil and industry. Owing to there being no rainfall, the acreage of land which can be put under crops depends absolutely on the amount of water available for irrigation, by wells. The total yield of the latter has, we know, fluctuated to a considerable extent at different times, and one may surmise that, could figures be obtained giving the number of inhabitants and the volume of the water-supply for different periods during the last 5,000 years, a remarkably constant ratio would be observable between the two" (pp. 62-63).

Abundant ruins in places not now occupied and numerous old canals leading from wells now dry support the statements quoted above. It may be true, as Beadnell says, that in Roman days a large part of the population were engaged in "mining, boring, and the excavation of subterranean aqueducts," but, in order to support these artisans and give them work, there must certainly have been a much larger number of people who were engaged in agriculture. If this were so, the agricultural population, and hence the supply of water must evidently have been much greater than at present. In the old days the number of wells was probably not much in excess of that of to-day, for although many have dried up, a large number of others have been bored during the last 50 or 60 years. The ancient wells were not so deep as the modern ones, which is, perhaps, one reason why the modern wells discharge water although many old shafts have run dry or give only a little. Beadnell mentions many instances of ruins where no villages now exist and of land which has gone out of cultivation. For instance, in referring to Maks Kibli, in the southern part of the oasis, he says: "Here as elsewhere in this part of the country much land has gone out of cultivation, though it must be mentioned that the villagers are rather progressive in planting trees and maintaining small vegetable gardens." Farther south he mentions a well, Ain Mabruka, which "just trickles and irrigates a tiny area of not more than a few square meters. This is the most southerly point at which exposed water is to be seen, though in the midst of a large area of scrub still farther south a sanded-up well by the name of Ain El Terfai is

reported to exist" (p. 85). Another place where the flow of water must have seriously diminished, is Dakhakhin. "The ancient Dakhakhin must have been as ugly as the modern village is pleasant . . . . the ruins are only slightly above the level of the plain, but cover an area many times greater than that occupied by the modern village. This circumstance alone shows how insignificant is the present flow compared with what it must once have been" (p. 80). Again, "At Ain Bella . . . . there are at present only a few acres under cultivation, but the tract anciently tilled is seen in the eroded remains of an alluvial platform to the northeast. This is now a deeply grooved and ridged hummocky area of loam full of dead palm stubs with rootlets ramifying in every direction. The original terrace [that is, cultivated alluvial platform] appears to have extended far to the north. . . . At one time or another many wells existed to the west but are now buried in the dunes, their former presence being testified by isolated exposures of arable land, and by occasional trees and bushes. The dunes following their natural S.S.E. course in the direction of the prevailing winds, seem to be still encroaching on the belt of country occupied by the existing wells and cultivated lands, and it is probably only a matter of time, perhaps a few hundred years, before they blot out the whole of the south part of the oasis. The sand speedily envelops any settlements which are abandoned, as nothing encourages the formation of dunes to such an extent as vegetation, and this nearly always abounds in the neighborhood of the wells" (pp. 83-4).

Facts such as these and many others show unquestionably that the area under cultivation has greatly diminished during historic times. They show further that at present the encroachment of sand is a very serious matter. The statement that nothing encourages the formation of dunes to such an extent as vegetation is only partially true. In Chinese Turkestan the writer observed again and again that dunes of great size grow up upon the edge of an area of vegetation, but do not penetrate very far into it. In the same regions it was also noticeable that wherever vegetation had died, there the sand began to move. If the climatic conditions of a country remain stable for any length of time, the dunes of interior regions away from the seashore advance only until a certain point of equilibrium is reached. Thereafter the sand encroaches not at all or only at an imperceptible and constantly diminishing rate. The fact that dunes are now advancing upon cultivated regions

shows that in relatively recent times there must have been some change in the conditions of vegetation.

Another point which indicates that present conditions are different from those of the past is the roads leading out from the oasis. One such road once ran from Kharga westward 500 miles to Kufra, passing to the south of a great area of sand dunes. "It is probable." says Beadnell, "that within the last century the area of this sand has extended considerably to the south, as an old caravan road trending westwards and believed originally to have connected the oases of Dakhakhin and Kufra is now lost in the dunes" (p. 4). In the same way, from the spring and ruins of Ain Amur, "very old tracks trending in a westerly and northwesterly direction are noticeable, and although unused at the present day these may mark the presence of former frequented routes leading to the oasis of Farafra. At the present time that oasis is not in direct communication with Kharga, the routes used being from Manfalut in the Nile Valley, from Qasr Dakl in the oasis of Wakhla and from Ain el Hais in Baharia" (p. 38). These two abandoned roads have not been carefully investigated, but what is known of them suggests that at the present time the Libyan desert is much more difficult to traverse than in the past. A similar suggestion is given by the water stations along the old Roman roads which connected Kharga with the Nile valley. One such is found in El Tundaba, a deep shaft sunk in a hollow full of silt in the plateau half way from the Nile to the oasis (p. 29). The shaft and the hollow are now quite dry, but flints, pottery and graves indicate that the place was once the site of a settlement. It cannot be inhabited to-day, and the chances are that it could not have been inhabited in the past, if present conditions had then prevailed.

The last line of evidence as to the ancient water supply is found in a number of tunnels at Quasr Lebekha, Quasr Gyb, and especially Um el Dabadib, in the northern part of the Kharga depression. They are dug in the upper artesian sandstone. At the latter place there are in all four main tunnels varying in length from two to four miles. One of the tunnels has recently been thoroughly cleared out and is now in use, so that it is possible to estimate the relation between the amount of labor involved and the results obtained. The tunnel is "distinctly coffin shaped in cross section, being widest near the roof and tapering downwards" (p. 174). It measures roughly five by two feet. The tunnel is reached by vertical shafts about

five by two and one-half feet in size and varying in depth from a few feet near the mouth of the tunnel to 175 feet at the inner end. The shafts number 180 and are placed at intervals of about 65 feet on an average. The length of the main tunnel is 1.8 miles. The amount of vertical excavation for the shafts amounts to over two miles. Various branches and curves add somewhat to the length, so that the total excavation was fully four miles. Beadnell is impressed by the amount of labor in proportion to the results obtained. He says, "Although it is difficult to believe that the supplies of water obtained were commensurate with the time and labor involved in the construction of the collecting tunnels, we may safely assume that the engineers who so carefully planned and carried out the works had fully considered the results to be looked for. The ruins of villages and the traces of formerly cultivated tracts show that sufficient water was obtained to enable fairly large colonies to exist, though after the withdrawal of the Romans these outlying districts were abandoned, the aqueducts silted up, and the cultivated lands reverted to the desert" (pp. 170-171).

The tunnel, as we have said, was cleaned out a few years ago, and "water again flowed from the mouth of the aqueduct and enabled a small agricultural colony to establish itself on the site of the original founders" (p. 171). The tunnel is now in excellent repair, as Beadnell found upon traversing it to the upper end. In January, 1905, the discharge "from the mouth of the aqueduct was between thirty and thirty-five gallons per minute; a dozen acres or so of land had been reclaimed and were tended by seven or eight men, who informed me that the crops reaped there were equal to those in any part of the oasis" (p. 172).

A careful examination of the facts stated above shows that whereas in Roman times these tunnels enabled "fairly large colonies to exist," the tunnel which has now been re-excavated serves only to irrigate "a dozen acres or so of land." In other words, if the conditions of the past were like those of the present, "the engineers who so carefully planned and carried out the works" thought it worth while to excavate a tunnel about 1,800 feet long for every acre of land to be irrigated. The average well in Kharga, including old and new, good and bad, yields about 35 gallons of water per minute, which, as we have seen, is equal to the present discharge of water from the tunnel. The depth of a well varies from 125 to 800 feet. Wells of the latter depth were certainly rare in ancient times, and there is no reliable evidence that any were so deep. The average

well does not seem to have been over 250 feet deep. Assuming still that past conditions were like those of the present, we must conclude that the Roman engineers, in order to secure an amount of water equivalent to that from an average well, went to the labor of excavating tunnels and shafts four miles in length and with a size of five by two feet. In constructing an ordinary well the first process is to dig a hole about 100 feet deep and six feet square which would require the excavation of nearly 150 cubic yards of rock. Then a shaft perhaps 8 inches in diameter is drilled for the remaining 150 feet. The latter process is difficult, but, nevertheless, wells were drilled by the hundred in ancient times. Compare with this the labor of building a tunnel and shafts to a length of four miles. The total amount of excavation involved in building the single tunnel which has been opened is estimated by Beadnell at 4,875 cubic meters or 5,850 cubic yards. Such work was more difficult than the excavation of a large open well like that which under native methods was constructed as the first stage in boring a well; for the space where work was carried on was cramped, only one person could work at a time, and all the excavated material had to be carried to the shafts and hauled up, sometimes as far as 175 feet. To put the matter concisely the digging of a well involved the excavation of about 150 cubic yards of material, and the boring of a hole less than a foot in diameter and 150 feet deep. The excavation of a tunnel, on the other hand, involved the excavation of 5,850 cubic yards. In other words, if we deduct the excavation of 150 cubic yards of material from the labor involved in each case, we find that in order to get a yield of about 35 gallons per minute the driller of the well had to bore a hole only 150 feet deep, whereas the makers of the tunnel had to excavate 5,700 cubic yards of sold rock, digging a tunnel and shafts to the length of four miles.

The following quotation from Beadnell shows with what skill the Roman engineers carried on their work: "That the tunnel was most carefully planned and excavated is evident from its very low and gradual slope, as is indicated by the depth of water flowing through and by the generally unrippled character of the stream. Judging by the height of the mouth of one of the man-holes near the point of origin of the tunnel, and by its depth to the stream in the tunnel below, there only appears to be a fall of one meter in about 2½ kilometers, or a slope of 1 in 2,670" (p. 178).

There can be no question that the ancient engineers were skilled in their art. It is evident that such men would never have dug tun-

nels if, by scarcely one-hundredth as much labor, they could have drilled wells capable of supplying an equal amount of water. It may be thought that perhaps when the tunnel was first dug the yield of water was exceptionally large because new areas of rock were being continually opened. There may be some truth in this, but inasmuch as only one man could work in the tunnel at a time, and inasmuch as shafts had to be dug from above before excavation could go on, the progress of the tunnel must have been so slow that the effect of the opening of new rock must have been slight. By the time the work had paused long enough to allow a shaft to be sunk from above, the tunnel could scarcely have produced a flow much in excess of that which continued permanently. The upper artesian sandstone in which the tunnels were dug is exposed at the base of the cliffs bordering the oasis. Hence both before and after the construction of the tunnels it was subject to natural drainage through springs. Therefore, it contained no stored up supply of water like that found in the other sandstone, far below the surface. The only reasonable supposition seems to be that when the Romans built these great irrigation works, the sandstone contained a much larger supply of water than at present. Such a supply of water can have come only from increased rainfall.

We have now seen that there is close agreement among many lines of evidence such as lacustrine or alluvial deposits, ancient spring deposits, ruins, ancient areas of cultivation, diminishing wells, roads in the desert, and tunnels where now no tunnels would be built. All these varied phenomena are explicable if we suppose that the average climate for many centuries in the past was distinctly moister than the average climate of to-day. Let us now see whether there is any evidence to show how the change from the past to the present took place. Was it a steady decrease in rainfall or did occasional periods of exceptional aridity alternate with moister epochs?

In prehistoric times human occupation of the country around Kharga seems to have been more extensive than at any succeeding period. During the palæolithic stage of development men occupied not only the floor of the Kharga depression but also the surrounding plateau; in the neolithic stage the area of occupation had decreased and the population was apparently most dense on the border of the depression near the foot of the cliffs. The center perhaps was occupied by lakes or swamps. Coming down to historic times we have records which tell us that Egyptian kings claimed allegiance of

the inhabitants of the oasis as far back as the 18th dynasty, 1545-1250 B. C. In Kharga itself the oldest ruins are those which belong to the time of Darius, about 500 B. C. At that time the Persians cultivated the oasis and built various temples, among which the temple of Hibis is still standing. This must have been a period of great prosperity, but our information in regard to it is very slight. Other ruins date from the time of the Ptolemies, and still more from the Roman period, beginning about fifty years before Christ, and lasting until A. D. 395. During the latter part of the Roman period the oasis was perhaps less prosperous than before or afterward; for there was much less activity in architecture than there had been in early Roman days or than there was during the Byzantine era which immediately succeeded it.

In regard to the location of ruins Beadnell makes an interesting statement. "In the first place," he says, "they are mostly on or near the extreme margin of the lacustrine deposits; secondly, they are absent altogether from the central portion of the lake site; and thirdly, the older monuments occupy the highest levels, while there are no representatives at all of the earlier Egyptian periods. While the disposition of the monuments may, of course, be entirely fortuitous, we are justified, I think, in assuming that the lake existed well into the historic period, and may have still stood at the 65 or 70 meter level when the temple of Hibis was erected by Darius, about 500 years before the commencement of the Christian era. In the time of the Ptolemies, it was certainly considerably lower, while in still later days, when the country became a Roman province, the lake had very much contracted, and probably only existed as a marshy swamp occupying the lower portions of the depression" (pp. 117-118). It is worth noting that during this period when according to Beadnell the lake was steadily decreasing in size, there was a great development of irrigation works. To quote from our authority once more:

"It was during the sway of the Roman Emperors that the Egyptian oases attained their maximum importance. During this period from 30 B. C. to about the beginning of the seventh century, extensive towns existed in Kharga, and the oasis was strongly garrisoned and protected by forts. Temples and other edifices were erected, while a great development of the water-supply took place. During the same period the oases were used as places of banishment, just as they were in earlier days under the Pharaohs, and have been, in a way, in quite modern times. Juvenal, the Latin satirist, was ban-

ished to Syene at the beginning of the second century, as a punishment for his attacks on the Court, and he appears also to have been for a time confined in Kharga; Athanasius, Nestorius, and other celebrities likewise made unwilling acquaintance with this portion of the Empire. Sayce remarks that the oases under the Romans were thoroughly cultivated, a brisk trade in wine being carried on, and mentions that on one of the temple walls there are several inscriptions which lead one to infer that Kharga yielded a considerable revenue . . . . . (p. 94).

"Although the Persians and Romans left abundant traces of their occupation of the country in the shape of temples, forts, and monasteries, the determination and energy with which they prosecuted the colonization and general development of the oases is best shown by their attention to works of public utility. At no period in the history of the oases has so much attention been paid to the water-supply. Not content with tapping the deep-seated sources by means of bores, they carried out underground works of considerable magnitude and involving engineering difficulties of no mean order, so as to obtain additional supplies from the sandstones lying at or near the surface. The methods employed were probably introduced from Persia, where underground aqueducts, or 'kareez' for the transference of water from one locality to another, have from an early date been employed. At the same time, judging by the character of the ancient buildings in the immediate neighbourhood of the most important of these works, it seems probable that the latter were for the most part constructed by the Romans" (pp. 167-8).

These long quotations have been inserted because of the significant fact that irrigation works were developed at just the time when the lakes were drying up, or when the streams which supplied the alluvial deposits were diminishing. Apparently, this great activity in digging wells was due to the fact that during the period immediately after the time of Christ especial need was felt for a larger supply of water.

Before leaving the ancient history of Kharga, another fact deserves to be recorded. In those days Kharga and the oasis of Dakhla, 75 miles further west, were included under the common name "The Great Oasis." To-day they are distinctly two oases separated by many miles of desert. They would scarcely have been called one oasis unless they had had a closer connection than that of to-day. Such a closer connection would only have been possible if the intervening country were moist enough to be inhabited.

The further history of Kharga may best be described by quoting once more: "With the withdrawal of the Roman garrisons and the Mohammedan conquest decay set in, and, as Sayce remarks, the aqueducts became choked, the fields were neglected, and malarial fever invaded a district which had at one time been regarded as a health resort.

"Of the history of the oases during the succeeding seven or eight centuries no records are available, but, judging from the writings of Arabian geographers, between the eleventh and the fifteenth centuries, it is evident that they gradually became depopulated, and were regarded as of little importance. El Sherif el Edrissi, writing about the middle of the sixth century of the Hegira (1150 A. D.), refers to the oases (Al Vahat) as places formerly containing streams of water, with lands on which trees were still found growing, and with ruined, uninhabited towns. He adds that the goats and sheep had become quite wild, and were trapped by hunters like other wild animals" (p. 108). Beadnell is inclined to believe that Edrissi's statement cannot refer to Kharga proper, but to some outlying region. "It seems" he says "extremely unlikely . . . that the Great Oasis as a whole had become entirely uninhabited." To the writer of the present article this does not seem at all unlikely. As he has shown elsewhere, the twelfth century appears to have been a period of extraordinary aridity, second only to that of the seventh century, and aridity would inevitably cause depopulation in Kharga.

Yakut, an Arabian historian, writing about 1225 A. D., speaks of three oases in this region and refers to the first of them as being well cultivated, containing streams and hot springs, palms and cultivated lands. His description suggests that Kharga was more prosperous in his day than it had been three quarters of a century before in the times of Edrissi. Ismail Abulfida, writing about 1300 A. D., speaks in still better terms of the oasis, which in his day abounded with palms and running water. Since that time we have practically no information until about a century ago.

The various phases through which the history of Kharga has passed may now be summed up and compared with the climatic vicissitudes of the country. Up to the time of Christ and on until the third century of our era the fortunes of Kharga were relatively high. Toward the end of the Roman period they declined somewhat, but rose again during the Byzantine period, from the fourth to the sixth century. Then in the seventh century they fell to a most deplorable condition. During the years that followed we have no

information as to the fate of the oasis till the days of Edrissi in the twelfth century. Then, again, if the Arab writer is to be believed, Kharga was in a state worse by far than to-day. Soon, however, she rose once more, and at the beginning of the fourteenth century enjoyed a certain degree of prosperity. Since that time there may have been a little falling off, although here again our information is scanty. In regard to the water-supply, all the evidence points to a decrease since the time of the Persians. Apparently, this had no great effect until the time of Christ or afterward. Even at that time, if our conclusions are correct, it was not particularly harmful, because the decrease in the natural supply induced the people to provide an artificial supply, and thus, perhaps, stimulated rather than hindered industry and civilization. Between the period of decay toward the end of the third century, when the power of Rome was waning, and the brilliant Byzantine period some two hundred years later, we have, in Kharga itself, no evidence of any change of climate. Nevertheless, if Beadnell's repeated statement as to the close relation between density of population and prosperity, on the one hand, and water-supply, on the other, is true, the Byzantine period was probably somewhat moister than the latter part of the Roman period. Judging from the extreme depopulation in the seventh century the early Mohammedan days must have been a time of great aridity, although the general commotion which then took place in western Asia and northern Africa makes it impossible to draw any positive conclusions from Kharga alone. During the succeeding five centuries we have no definite information as to Kharga, but in the twelfth century we find it again almost depopulated, a condition which suggests but does not prove great aridity. In the next two centuries there seems to have been an improvement in the habitability of the oasis. How that time compared with the present it is impossible to tell.

A comparison of the history of Kharga with the climatic pulsations of which evidence is found in Central and Western Asia is highly instructive. The pulsations are represented in the accompanying curve (Fig. 3), which is taken from the author's volume "The Pulse of Asia," but has been modified somewhat to make it conform to new data obtained during the Yale Expedition of 1909 to Palestine. Horizontal distance represents time, and vertical distance the amount of rainfall. Thus the curve is high during moist periods and low when the climate is dry. The curve is based upon a large body of facts as to the abandonment of ruins, the giving up of old roads because of lack of water, the fluctuations of enclosed

lakes, and the disappearance of springs and other sources of water. It will be seen that it agrees exactly with our inferences in regard to Kharga. So far as our information goes, the Libyan oasis has prospered and had a large supply of water at exactly the times when the climate of western and central Asia has been comparatively rainy. Its supply of water has decreased and its population has diminished

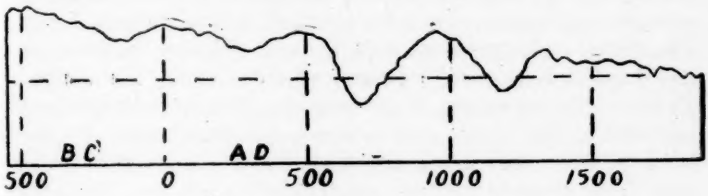

FIG. 3.

coincidently with similar events in Asia. So close an agreement among the phenomena of regions extending from Lybia through Arabia, Persia and Turkestan to the far confines of China, would scarcely be found unless the whole area had been subjected to a uniform series of important climatic pulsations.

THE ISLAND OF SÃO THOMÉ.

It is believed that no tropical country to-day possesses, for so small an area, a degree of economic prosperity that is comparable with that of the Portuguese province of São Thomé and Principe. They have advanced, in a few years, to the first place among the cacao producing countries, wresting the primacy from Ecuador, which had long held the first place. In 1905, their production was 23,187 tons, while that of Ecuador was 18,268 tons. The new development of agriculture in São Thomé dates only from 1870, but in 1904 it was exporting annually over $6,000,000 of cacao and coffee. Perhaps, in our day, there has been no agricultural development comparable with this, in so short a time and with so little capital and so small a force of toilers.

For some years past Mr. Aug. Chevalier has been in the service of the French Government studying the agricultural possibilities in the chief African colonies and looking for favorable places at high

altitudes that may serve as sanitariums for Europeans in the tropical service. Mr. Chevalier has spent six weeks in such investigations in São Thomé, and a paper written by him on the results of his inquiries has been printed in French in *Occidente* (xxxiii, No. 1130, pp. 105-120, ills., Lisbon, May 20, 1910), from which the following facts are taken:

São Thomé lies in the Atlantic, the Equator passing through its southern edge, about 163 miles west of Gaboon (French Congo) and fifteen days by steam from Lisbon. Its area is 390 square miles and it is 31 miles long and 19 miles wide. The island of Principe, the other part of the province, lies ninety miles to the northeast of São Thomé, and its area is 49 square miles. Its population numbers only a few thousands and its agricultural production, chiefly cacao, is relatively small. The inhabitants of São Thomé are centered in the capital, of the same name, in seven villages and in about 250 roças or plantations scattered over the island. The population of the two little islands in December, 1909, was 68,221, of whom about 2,000 were Europeans, 23,651 natives of the islands, and the remainder, imported laborers and their families, nearly all from the west coast of Africa and 31,878 from the interior of Angola.

Both islands are exclusively igneous in their geological constitution. They form a part of the volcanic chain which extends across the Gulf of Guinea from the Spanish island of Annabon to the German peak of Cameroons on the mainland. The rocks are basalts, trachytes and phonolites. The volcanoes have long been extinct. A spring at the Santa Cruz plantation in São Thomé, discharging much carbonic acid, is the last known trace of volcanic activity. There are craters at or near the summits of the peaks and the remains of many others scattered over the island slopes. In the south of São Thomé are some gigantic monoliths of basalt, rising many hundreds of feet above their base, with vertical walls. The chaos of towering peaks, with precipitous faces, of deep narrow gorges half choked with enormous rock fragments, the wider, pleasant valleys, all the sharply contrasting and abruptly succeeding features of the landscape, testify to the power of the cataclysms that brought the island forth and to the ravages of time that have modified the forms of the surface.

Seen from the sea, São Thomé has the appearance of a fantastic chaos of mountains, cut up by ravines, some of the eminences surmounted by peaks that rise naked above the verdure and are lost to sight in the clouds that almost perpetually enshroud them. Ex-

cepting these higher points, the island appears to be completely covered with marvellous tropical vegetation, but this appearance is somewhat deceptive, for about half of the area of the island is now covered with industrial growths introduced by man. What gives from the sea the illusion of a vast forest covering the whole island is, in very large spaces, a spreading mass of fruit trees; and many of the forest trees were intelligently selected for preservation, when the land was cleared, to give shade to millions of cacao trees and banana plants. What seems, at first glance, to be virgin forest is, in fact, a great tropical garden of incomparable richness containing nearly everything that man draws from the vegetable kingdom for his needs; for even European vegetables thrive finely in this little land of many differences of altitude and climate.

Scarcely any country would seem, at first view, to be so little adapted for agricultural development. The stranger is lost in admiration as he observes by what enormous and patient toil the tangled forest on these slopes has been made to give way to large and well-managed plantations. The abruptness of the steep-sided valleys has been modified. Millions of tons of the rock fragments have been piled along the borders of the roads. Many of the torrents have been harnessed and are kept within bounds, and the giants of the forests have been cleared away. The cacao tree is thriving on the slopes of many valleys which were so steep that they seemed almost inaccessible to man. The visitor knows scarcely which to admire most, the fecundity of the soil which yields such splendid harvests or the patient and prodigious efforts of the Portuguese which have won so complete a triumph over savage nature.

Half of the island is now under cultivation; a quarter of it, in the central part, still forest clad, is adapted for reclamation and will be added to the industrial area. The last fourth, comprising the marsh and dunes of the littoral, especially in the north and northeast of the island, the sterile and almost inaccessible peaks of the interior and the escarpments of basalt will never be of value for agriculture. The abundance of flowing water has greatly favored agricultural development. Few countries are so rich in running water. The people say there are as many rivers as there are days in the year. The cascades are almost innumerable, and nature thus affords a great reserve of water power, which is only just beginning to be utilized. Thanks to one of these cascades, the great plantation of Bóa-Entrada has now in operation an electric lighting plant. In some places towards the sea, the land slopes gently to the ocean, and in the northeast part of the island, where the precipitation is not

sufficient for some profitable crops, the streams flowing slowly over these narrow plains are utilized for irrigation.

The climate is clearly insular, very humid, and the temperature scarcely varies throughout the year. Still, there are important differences in climate, considering the smallness of the island. In the north and northeast, the dry season is of long duration. In winter, it is exceptional in this region, for rain to fall incessantly for many days. The city of São Thomé is in this zone. The rainfall here is about one meter a year, which is not sufficient for cacao cultivation without irrigation.

On the west coast, the annual rainfall is a little less than on the north shores, though the rainy season is longer, extending from the end of August to June 15.

The region of the high altitudes, through the center of the island, has its special climate. At the highest altitude, about 2,025 meters, the climate is moderate and humid and the temperature seldom descends below 0° C. or rises above 15°. Many specimens of European flora are found. The flanks of the mountains, from 1,200 to 2,000 meters, are usually enveloped in thick fog. In this zone, the temperature is usually below 20° C. and this is the region in which the Cinchona (quinine tree) thrives best.

The cacao tree is not easily cultivated at a higher altitude than 700 meters above the sea. The great plantation of Monte Café is at this altitude. The meteorological data for a year shows total rainfall of 2.739 meters, distributed in millimeters as follows:

Jan., 104; Feb., 20; March, 377; April, 405; May, 481; June, 69; July, 80; Aug., 49; Sept., 223; Oct., 481; Nov., 312; Dec., 138.

The mean annual temperature at Mont Café is 22° C. This is a little too low for the most successful cultivation of the cacao tree, but the lowest temperatures are in May and June during the repose of the tree. Cyclones which are so destructive to tropical agriculture in many lands, are almost unknown among the islands of the Gulf of Guinea. Strong winds are injurious to the cacao tree and it is raised only where it can be well sheltered.

This plant was introduced into the island in 1822, but little attention was given to its cultivation, and in 1869 only about 50 tons a year were exported. It was only in the last quarter of the nineteenth century that the crop began to be important.

The island was discovered in 1470 by the Portuguese navigators João Pedro de Santarem and Pedro Escobar. It was Dec. 21, the day of Saint Thomas. The island had no inhabitants. Almost immediately, it was apportioned among members of the royal house of

Portugal. In 1493 a part of the island was assigned to Alvaro de Caminha, who began to colonize São Thomé with slaves brought from the neighboring mainland. In 1522, São Thomé ceased to be a royal preserve and the island was thrown open to colonists from Madeira, and Jews, expelled from Portugal, were settled there. The Jews, as a race, have won little renown as agriculturists, but it was these Portuguese Jews who did most to develop sugar cane planting in São Thomé and to start an era of prosperity that is comparable even with that of these latter years. In the middle of the sixteenth century there were 80 sugar mills in the island and a population of 50,000 souls. From this era date many of the old monuments and ruined churches that are scattered around the bay of Anna Chaves.

Then, early in the seventeenth century, came the invasion of the Dutch and the ravages of French and British privateers. The island was ruined, the Portuguese colonists fled to Brazil, and the slaves and convicts, left to themselves, fell into a state of frightful anarchy and barbarism. The dawn of better times did not come for more than a century, and it was not till 1795 that the coffee plant was brought to São Thomé. Coffee became the staple product and retained its primacy till it was superseded by cacao.

Other export crops have been introduced, but they have been completely cast in the shade by the marvelous growth of the cacao industry. Sugar cane is still grown on some of the large plantations, but the industry is steadily declining. Liberian and Arabian coffee makes a good showing in the exports, but has been left very far behind by cacao. The kola nut, vanilla, Guinea oil palm and many tropical plants and essences give good returns, but are almost neglected. Cacao is to São Thomé now what gold was to California in the early fifties of the last century. All the European vegetables thrive at altitudes from 1,000 to 1,400 meters and may be planted or sown every month in the year; and many European weeds have also crept in and are a pest in the gardens.

The cacao export figures for this little island are very remarkable. The official statistics show that the value of the exports in 1900 was $4,217,652. The annual product has been increasing rapidly since then and the value of the exports in 1909 was $9,158,396. The total value of the cacao exports in these ten years was $68,219,854. On the other hand, the cultivation of coffee is steadily decreasing, having dropped from $721,952 in 1900 to $313,366 in 1909. All other exports are of small importance.

For some reasons, the future of the cacao industry would seem to be very brilliant. There are now about 75,000 acres in cacao trees

and there are 12,500 acres of young plantations that are not yet in bearing. Furthermore, there are about 62,500 acres of land well adapted for the cacao tree that await only clearing and cultivation to add them to the productive area. One plantation of only 2,500 acres reports a clear profit of $80,000 a year.

But the planters have some serious misgivings. The tendency of the price of this raw material of cocoa and chocolate is downward. New plantations are being opened in all the warm countries. The question of labor also is a grave problem that is yet far from solution. All the world knows of the serious charge that the system of recruiting labor in the Portuguese province of Angola, for the plantations of São Thomé, practically reduces the blacks who are thus engaged to a state of slavery. It is expected that the law of July 17, 1909, will do away with the evils that have disgraced the recruiting system; and new currents of immigration from Mozambique and the Cape Verde islands will help towards a solution of the labor problem.

But there is still another very serious question before the planters. The mortality among the plantation blacks is frightful. About 80 per cent. of their children are dying in their first year. About 10 per cent. of the plantation hands, men and women, die annually. This is a terrible condition that requires a remedy.

The exports are now three times as great as the imports, a fact that does not speak well for the social well-being of the populace. All these facts are blemishes in the history of São Thomé's remarkable industrial development. They are facts that the Portuguese Government should try to remedy. According to Mr. Chevalier, Portugal has done almost nothing for the colony from which it is drawing a fine revenue in export and import taxes. It is, however, now building a railroad from the coast which has reached Trinidad in the interior. Further than this it has promoted no public works. It is the planters themselves who have built the roads, cleared away the forests and done everything to make possible the wonderful development since 1870. Private initiative has wrought the transformation; and the Portuguese planters have good reason to be proud of the material results they have achieved.

KATANGA'S COMMUNICATIONS AND MINERAL WEALTH

According to information received by *Le Mouvement Géographique* (Vol. 24, No. 24, Cols. 295-298, June 12, 1910), rail laying had been completed for 171 miles on the second section of the railroad which the "Compagnie des chemins de fer des Grands Lacs" is building to circumvent the cataracts and rapids that obstruct navigation on the upper Congo. The first section, from Stanleyville to Pontierville, seventy-five miles, has been in operation for about two years and steamers launched upon the smooth waters above, have been carrying railroad material to Kindu where further obstructions are met. The second section of the road, starting from Kindu, will pass around the last obstructions to navigation and will terminate at Kongolo, just above the Iron Gates. This section is 217 miles long and the road-bed has been prepared for the rails to within twenty-five miles of Kongolo which stands on the left bank of the Lualaba-Kamolondo branch of the Congo.

This enterprise has been hastened as rapidly as possible in order to provide, through the Belgian Congo, a steam route between the mouth of the river and the great mineral field in the southern part of the Katanga province of the colony. Above Kongolo, the river is navigable for light draught vessels for 400 miles farther south. It is expected that the second section of the railroad will soon be in operation; and when trains are running to Kongolo there will be uninterrupted steam transportation along the Congo, by water or land, for about 2,250 miles, from the mouth of the river to Kalengwe Falls, the extreme limit of navigation.

The development of Katanga is now the foremost purpose in the policy of the Belgian Congo; and it is expected that, before very long, a railroad will be extended across the province from the head of navigation to the southern border. Then the mining region will have steam communications on or along the Congo to the Atlantic.

For want of railroad or river communications, Katanga has been almost isolated from the outer world. It is in the heart of central Africa and, until about three years ago, it could best be reached by the Zambesi, at Chinde or Tete, necessitating a journey of hundreds of miles on foot, as the tsetse fly prevented other means of transport. Then, the Rhodesian or Cape to Cairo railroad was completed to

Broken Hill, 250 miles from Katanga's southern border and the mining field could be reached from England in six or seven weeks. A branch of this road has now been extended to the border and England is only four or five weeks away. Another railroad has been pushing inland from Benguela, on the Atlantic. Its ultimate destination is the Katanga mining region. The road-bed has been graded almost to the Bihe plateau and rail laying is considerably advanced, but practically all work on the line is at present suspended.

Mr. J. H. Ivey, mining engineer, has a conservative and able article on "The Mineral Wealth of Katanga" in the Seventy-Seventh *Annual Report* of the Royal Cornwall Polytechnic Society (New Series, Vol. I, Part 2, 1910, pp. 329-342, Penryn), from which the following facts are condensed.

The province of Katanga has been specially favored by nature. It is well watered by the Luapula, Lualaba, Lubudi, Lufupo, and Lufira and their affluents, the whole of which finally coalesce in the Congo. Their trend is from south to north and, with the exception of the Luapula, they take their rise in the mountainous divisions between the Belgian Congo anl the British and Portuguese territories. The work of making the Congo-Lualaba system available for a steam route to the Atlantic is outlined above.

The country is generally well wooded, extensive patches of open bush alternating with smaller areas of unwooded lands. The copper belt, trending in a north-westerly, then westerly, direction, in the southern part of the province, includes a large area of sterile and uninteresting country on and about the outcrops of copper ore.

The average rainfall is about fifty inches a year. This is true for that part of the province south of 10° 30′ S. Lat., but further north, the rainfall is probably much higher.

The country generally lies at an elevation of 2,000 to 3,000 feet. The copper belt is of higher altitude, ranging to 5,000 feet and generally exceeding 4,000 feet. The climate on this belt is ideal and highly suitable to Europeans. Malarial fever is almost unknown, the only dangerous period of the year appearing to be at the change from wet to dry season (May and June) which corresponds with change from hot to cold weather. The early mornings are then often intensely cold, and great care must be taken to avoid chills. Off the copper belt the climate seems less agreeable, being undoubtedly hotter, and malaria, spirillum and blackwater fevers are prevalent.

Prospecting work in Northwest Rhodesia and Katanga was first begun in 1900 under the auspices of the Tanganyika Concessions

Company. The great success of the various expeditions is now well known. The deposits already located include copper, tin, gold, platinum and palladium ores, with coal and the necessary fluxes for smelting, hematite, limonite and limestones.

The outcrops of the copper deposits occupy a belt extending for a distance of about 200 miles, with a width of thirty-five to sixty miles. From Kambove Camp, which may be regarded as a center, the belt extends southeast for about 100 miles. From twenty to thirty miles from Kambove, the course of the belt is northwest, then generally due west to the Quilu river (Dikulive Mine), thirty miles west of the Lualaba. Here it abruptly turns to the south, and has not been traced beyond a few miles. Outside the area of this belt, and chiefly in the southeastern part of the state, are isolated groups of mines, possibly connected with the Rhodesian group of copper mines at Bwana, Mkubwa, Kansanshi, etc. The country rocks of the belt are alternations of sandstones and shales, in varying stages of induration, with limestones and hematite and limonite rocks. The deposits of copper ore occur in folds of the sandstone and shale strata in anticlines, synclines, etc. The greater number are anticlinal and form conspicuous landmarks, as the outcrops are invariably free from bush, with stunted herbage, and also devoid of ant-heaps. Copper exists chiefly as malachite but chrysocolla, azurite and cuprite are commonly found.

Mr. Ivey describes a few of the numerous copper mines on this great belt and among them he speaks of the Fungurume mine which, he says, can be quarried to a depth of 200 feet and is estimated to yield over 4,000,000 tons of ore to this depth, 7 to 8 per cent. being copper. In Kambove No. 2, the cross cuts at the bottom of the five shafts show from 13.3 per cent. to 17 per cent. copper. "These high values and the great extent of the deposits . . . will, no doubt, enable Kambove to rank among the very largest copper producers of the world. . . To enumerate only Dikurwe, Musonoi, Kolweze, Fungurume, Kwatabala, Kakanda, the Kambove and Msesa groups, with Chituru and Likasi is sufficient to warrant all the good things that have been said of the copper prospects of Katanga. There is, without doubt, enough copper reasonably developed, easy to mine, and favorably situated with regard to power, flux and fuel, fully to reimburse the shareholders of the interested companies for all their past and any future contributions."

The tin deposits (cassiterite) were first discovered by the prospectors of the Tanganyika Concessions late in 1903. The Busanga tin area is the best known and its probable extent and value have

been determined. The deposits have been exploited by sinking ninety-six pits, at regular intervals, over the supposed full stanniferous area (1⅛ million square yards). Sufficient work has not yet been done to say whether Katanga is likely to become a large producer of tin from reefs. There is no doubt, however, that the alluvial ground of the Busanga, Kasonso and other areas will, when the conditions are more favorable, yield, at a profit, large quantities of cassiterite. These alluvial deposits extend almost continuously over an area about equal to that of the county of Cornwall, where tin is mined in England.

In the Ruwe region, soil and subsoil of varying depths are often found to carry gold. In the roughly stratified sandstones, the broken up portions are very auriferous, the gold being in flat, angular pieces, sometimes with irregularly shaped nuggets weighing up to nine ounces. Nuggets of two ounces or more are of frequent occurrence. There is also much free gold. The gold is very pure. It is recovered by washing the dirt in riffled sluice boxes. Native labor is utilized in the mining and transport of the dirt and for feeding the boxes, under the supervision of one or two white men. The first six months gave an output of 2,770 ounces at a working cost of $8,805. Further large auriferous areas were opened out and the yield has occasionally been close to 1,000 ounces for a month's run.

The so-called hanging wall (bedded sandstone) carries small quantities of fine gold.

The "reef" (ore body) of finely bedded sandstones carries with other minerals, gold, silver, platinum and palladium. The ore body has been exposed by shafts, accompanied by driving and cross-cutting, to sixty feet in depth and 1,000 feet along the strike. With platinum at gold value, the writer judges the mine proposition to be worth at least $10 per ton over five feet of reef.

The labor supply has, thus far, been ample. The "boys" have been recruited from Northern Rhodesia and, with a wise native policy there should be ample labor available from Katanga itself. The cost of labor has been very cheap, running from $20 to $25 per "boy" for a four months' contract, this price including recruiting charges and keep.

NOTES ON THE DESCRIPTION OF LAND FORMS.—I.

THE KAMERUN REGION. By K. Hassert. (Forschungs-Expedition ins Kamerun-Gebirge und ins Hinterland von Nordwest Kamerun. *Zeitschr. Gesellsch. Erdk,* Berlin, 1910, 1-35.) An observer's manner of presenting the facts that he has observed is so intimately bound up with a reader's appreciation of the facts as they are verbally presented, that the reader's attention may sometimes be profitably directed to the terms and phrases employed by the observer, as well as to the things that the terms and phrases represent. In the same way, the general method that underlies a description is of interest, as well as the things that are described. The article above cited is significant in both these respects. It opens with a concise explanatory characterization of the region visited, phrased for the most part in technical terms, from which the reader may at once conceive a mental picture of its leading features, and thus prepare himself for the readiest understanding of the later pages, which are presented in a partly explanatory, partly empirical narrative. The opening characterization is, in brief, as follows:

The region visited consists chiefly of granites and other crystalline rocks, which during a long existence as a land area were worn down to moderate or small relief, and then broadly but not completely covered with sheets of trachyte and basalt. The compound mass was afterwards fractured in all directions, and the blocks into which it was thus divided were irregularly displaced, long enough ago for the higher ones now to be elaborately dissected, while some of the lower ones have been aggraded. Young volcanic cones also occur, sometimes holding lakes in their craters. Waterfalls are abundant in the highlands.

The evidence on which this general statement is based is not presented in the article above cited, but is presumably to be found in the *Mitteilungen aus den Deutschen Schutzgebieten,* to which reference is made. It is, however, not with that evidence that we are here concerned, but with the presentation of the conclusions based upon it. The presentation is most lucid; it leaves no feeling of inaccuracy or uncertainty in the mind of the reader, who must be greatly aided in coming on the essence of the whole story at the beginning of the article, so that the items of form mentioned in the succeeding narrative may be immediately assigned to their proper place in the region as a whole. The reader may thus from the outset and without difficulty form a sufficiently defined mental picture of the upland blocks, limited by abrupt but dissected scarps and traversed by the ramifying gorges of young streams, and of the intermediate lower lands, on which the rivers flow little below the general surface; and then bearing this mental picture in mind he may hope to give the details presented in the succeeding pages

their proper rank. This hope is generally gratified, for the narrative makes frequent mention of dissected scarps, lava-capped cliffs, deep gorges and broad plains, which can for the most part without difficulty be given their appropriate location; but the reading of the article would have been still easier if its items had been somewhat more explicitly stated in terms of the introductory scheme; and more geographical illumination would have resulted had more frequent and more explicit correlation been attempted between the land forms and the conditions of human occupation. Unfortunately, some of the pages are largely empirical, and it is then difficult to conceive the relative positions of the elements that make up the landscape.

For example, one reads in effect: "The constantly ascending path led us to a grass-covered surface, dissected by gorges . . . Suddenly the wide plain of Bangem opened before us. A sharp cone rose out of it like an island . . . We descended rapidly . . . to Nyandong . . . and near a bold rocky peak, that dominated the district like a Matterhorn, we crossed the Mwe, a fine river which flowed into a rock-walled gorge . . . We next entered a deeply dissected forested mountain mass . . . where the road was bad and fatiguing" (pp. 11, 12). One may here easily infer that the grass-covered surface, reached by an ascending path, was one of the uplifted blocks; that the wide plain of Bangem was an aggraded depression; and that the Mwe flowed, as if in antecedent fashion, from a depressed block into and through an elevated block; but it would surely be easier for the reader, and safer also, if these matters had not been left to inference, but had been explicitly stated by the writer. The larger part of this excellent article makes so successful a departure from the empirical style of geographical description prevalent in the pages of geographical journals, that one must wish that its explanatory method had been extended so as to characterize all its paragraphs, instead of nearly all. For those paragraphs which are characterized by explanatory treatment many a reader must be warmly thankful.

The Glaciers of the Venetian Alps. By O. Marinelli. (I ghiacciai delle Alpi venete. Memorie geografiche, No. 11, 289 pp. Florence, 1910; many plates and figures.) This painstaking memoir contains many years' records of persevering study by one of the most active and progressive of Italian geographers. The work is a masterpiece of thoroughness outdoors and in; for the author has not only examined every little glacier in the mountains, but has brought together and discussed an elaborate bibliography. The greater part of the memoir (pp. 10-159) is devoted to a detailed description of individual glaciers. Then follow (pp. 160-246) sections on classification, erosive action, moraines, and other general matters; and finally a chapter (pp. 247-278) on the climatic limit of snow in this mountain group.

In point of method, this work offers an interesting contrast to the article previously cited. The author contents himself with purely empirical descriptions on

the earlier pages, while giving an account of the existing glaciers, item by item, but in the later pages he enters upon explanation and generalization. He there recognizes that the forms of the mountains have been largely affected by the erosive action of the great pleistocene glaciers; and he explicitly points out that certain neighboring cirques may have been thus enlarged from their earlier arm-chair form, and eventually converted into the semblance of a sofa by the partial or entire destruction of the intermediate spurs (186-188). This suggests that the acute and serrate ridges represent the reduced and sharpened remnants of larger and more rounded preglacial features. The author also concludes that the little glaciers of to-day, although they are accomplishing some small measure of erosive work, have but slightly changed the forms left by their predecessors. It therefore follows that the sites of the existing glaciers might be described in terms of the work done by the ancient glaciers; yet, as above stated, the descriptive pages of the first part of the memoir give hardly a hint as to this illuminating conception. The terms there employed are all empirical, such as culminating point, rocky or vertical walls, channels, rocky spur, cavity, cirque, "conca," and "vallone." Even such phrases as a "conca hardly meriting the name of a cirque," or "a kind of elongated rocky cirque," do not express the forms thus described in terms of their origin.

In view of the great progress that has been accomplished in recent years respecting the series of mountain forms developed during the modification of normal valley heads by the erosive action of growing glaciers, it seems ultra-conservative to make no use of this progress in a matter so closely pertinent to it as the description of the small glaciers of to-day that occupy cirques excavated to various degrees of development by former greater glaciers. The whole trend of modern physical geography is toward the use of explanatory description, as far as it appears reasonably assured, especially in scientific memoirs. Explanatory description is, moreover, the most effective kind of description, because the terms in which it is phrased are so much better defined, and therefore so much more easily conceived, than empirical terms. Hence, it is to be regretted that the well grounded considerations which lead to the interpretation of cirques as glacially excavated valley heads in various stages of development should be postponed to the later pages of a memoir, in the earlier pages of which these considerations might have been put to practical use as furnishing the best means of concisely and intelligibly describing the higher parts of strongly glaciated mountains, in which the small glaciers of to-day linger.

Explorations in Bolivia. By P. H. Fawcett (*Geogr. Journ.* xxxv, 1910, 513-529). This paper may be taken as an example of an entertaining and lively account of an arduous journey. The author describes travel in Bolivia as beset with dangers, difficulties and discomforts of many kinds, including Brazilian outlaws, revengeful savages, tangled and thorny undergrowth in pathless forests,

heavy nuts that fall 100 feet or more with bone-breaking force, wild beasts on the land and ravenous fishes in the rivers, innumerable insect pests, and dreadful diseases. Hence it is natural enough that one who survives a visit to the interior of that country should return home well supplied with personal incident with which to lighten his report; but it is regrettable that, as a result, the objective description of the country itself should be for the most part relegated to the background. Physiographic observation was presumably difficult, all the more so as much of the journey was made in boats on forest-lined rivers that traverse plains; yet, as the author's first avowed object was to give "a general idea of Bolivia as it is to-day," something more specific about hills and plains and rivers would have been helpful. It is, however, highly significant of the unsystematized condition of present geographical methods that, when occasional mention is made of the landscape, which constitutes the stage on which all the Bolivian players act their parts, its features are presented to the mature readers of one of the leading geographical journals of the world chiefly in terms of the elementary nouns of school-day geography lessons, qualified with somewhat more grown-up but still untechnical adjectives. One reads such phrases as "across the passes of the Cordilleras are mule tracks following the long hog-backed ridges which extend like the tentacles of an octopus into the eastern forests," "mountain torrents which cut a roaring and resistless passage through their valleys of slate, gneiss and sandstone," and "a coffee-colored river cutting a sinuous course in a red lacustrine deposit"; but there usually is a disappointing absence of effective landscape description.

One of the few more significant statements is: "In the forest the accidents of the land-surface are for practical purposes [such as boundaries?] unrecognizable . . . No watershed is easily recognizable in the forests of this region" (524). A few more words here would have been very helpful in indicating the nature of the forest-covered plain: whether it is all subject to river inundation, as a large part of it would appear to be; or whether the flood plain area is really restricted to belts of moderate width, which stand a little lower than the rest of the plain. The latter would sometimes appear to be the case, for mention is made of the "great grass plains which lie inside the belts of rich forest bordering the rivers" (p. 515); but as the relative altitude of the grassy plains and the forested plains is not explicitly stated, the reader is left to inference where he would be glad to have observation. To be sure, topographical exploration in the forest must be extremely difficult, and likely enough no decision could easily be reached regarding the alternatives above suggested; but in that case even an explicit statement of mere inference or even of uncertainty by the observer would have been helpful to a reader who wishes to follow the author's account of "Bolivia as it is to-day."

The hills of Ricardo Franco are described as of exceptional relief; they "rise abruptly from the forest plains to a height of over 3,000 feet, crowned by formable precipices . . . reported . . . as impassable, owing to the terrific gorges which

cut up its sandstone formation" (p. 525). When the explorer crossed these hills, he found "the very accidented plateau . . . covered by long coarse matted grass, beneath which . . . the surface is strewn with sharp boulders . . . Day after day we came suddenly upon deep gorges, necessitating long détours . . . A few days later we got down with difficulty to the forest" (p. 527). The reader may perhaps picture this plateau as being capped with horizontal sandstones on a base of some weaker structure, elaborately dissected by retrogressive insequent gorges and ravines. If this be the case, it would seem to have been an easy matter for the author to make explicit statement of the significant facts, and thus relieve the reader from the uncertainty in which he must otherwise remain. Surely, the addition of a few technical or explanatory terms, like horizontal sandstones and mature insequent ravines, or something of like nature, would not be out of order in an article which abounds with strange words like pium, tucandera, chunta, espundia, barracas, haputama, apazancas, gehene, and mungruyu, these being the native names for various insects, diseases and other things, for which no equivalent is found in our vernacular.

W. M. Davis.

GEOGRAPHICAL RECORD

NORTH AMERICA

Land surveys in Alaska. The U. S. Geological Survey during the present year is making public-land surveys in Alaska under plans approved by the Commissioner of the General Land Office. An appropriation for this work was made at the last session of Congress. The appropriation is being used for subdividing the agricultural lands of Alaska so that they may be taken up by homesteads. The work to be done this season will cover the arable lands around Fairbanks, where many homesteads have already been taken up. A standard parallel and prime meridian will be established and, if time is available, some township lines will be run. The section lines will be run next season. These surveys are being made under the direction of Alfred H. Brooks, in charge of the division of Alaskan mineral resources of the Geological Survey. R. H. Sargent has direct charge of the field operations. He is assisted by C. L. Nelson, W. N. Vance, and S. G. Lunde. Mr. Sargent's party, which sailed from Seattle for Skagway on July 5, includes five or six other assistants, and additional men will be employed at Fairbanks, where horses and supplies will be purchased. The work will be carried on by three parties, each including six to twelve men and six horses. After organizing the work at Fairbanks, Mr. Sargent will go by trail to Valdez. He will make preliminary examinations in the Copper River valley for the purpose of preparing comprehensive plans for land surveys in that region. Mr. Brooks left Washington late in July for Knik and Cook Inlet, to make investigations on which to base land surveys in that district. Later he was to visit the Fairbanks parties. The Superintendent of the Coast and Geo-

detic Survey has sent a party to Fairbanks to make determinations of latitude, longitude, and azimuth to which the proposed land surveys will be tied.

MOUNTAIN AND VALLEY WINDS IN THE YOSEMITE VALLEY. In *Science* for April 15, 1910, François E. Matthes, of the U. S. Geological Survey, gives an account of the mountain and valley breezes in the Yosemite Valley which directs attention to the importance of these daily wind changes in that region. During the daytime, on the sunlit slopes, the dust from the horses' hoofs rises slowly in a cloud which accompanies the traveller who is ascending the zigzag path. On the shaded slopes the air currents set down hill, so that travellers who are descending continually meet their own dust, coming down from the trail above. In order to make the journey without the unpleasant accompaniment of the dust-cloud, the ascent should be undertaken when the slope is in shadow, and the descent when the slope is sunlit. This Mr. Matthes soon learned to do, successfully.

The up-cast and down-cast breezes alternate with rhythmic regularity. In the summer of 1905 the smoke from forest fires near the lower end of the valley was carried up the valley by the morning breeze, and by 9 or 10 A.M. it was hardly possible to see across from rim to rim. In the late afternoon, the down-cast mountain breeze swept the valley clear of smoke. This phenomenon continued daily for four months with scarcely an interruption: an almost tropical regularity, it may be observed, possible only because of the dominance of diurnal and the absence of cyclonic control. The placidity of Mirror Lake, likewise, depends on the blowing of the mountain and valley breezes. The water is most mirror-like in the early morning, when the down-cast mountain breeze has died out, and before the updraft of daytime has set in. The Yosemite Valley further shows very clearly the resemblance between the air-currents and the natural water-courses. The nocturnal down-cast breeze not only follows the bottom of the valley trough, as a channel, but also receives tributary air currents from the side valleys. Mr. Matthes speaks of the "chilling down-drafts that poured upon him," during his evening trips, from the mouths of the lateral hanging valleys. R. DEC. W.

THE DES PLAINES VALLEY OF ILLINOIS. The second of the educational bulletins of the Illinois State Geological Survey (T. W. Goldthwait, *Bull.* 11, Illinois Geological Survey, 1909, 1-103+x pages, with 9 plates and 21 figures) is another excellent example of the official publications by State geological surveys of the middle west for use of the people and the public schools of the region.

In simple, untechnical language Professor Goldthwait discusses the geography and history of the Des Plaines river, the structure and the concealed surface of the bed rock, and the glacial and interglacial deposits. The physiographic history of the Des Plaines is sketched, floods are discussed, and specific field trips in the area are suggested. L. M.

CLIMATE, MAN AND IRRIGATION IN THE GILA VALLEY. Dr. J. Walter Fewkes (Smiths. Misc. Coll., quarterly issue, Vol. 5, Part 4, 1910) has made a notable study of the "Prehistoric Ruins of the Gila Valley," reaching some conclusions which are worthy of attention on the part of climatologists as well as of anthropologists and ethnologists. The region where the Gila River and its two tributaries, the Salt and the Santa Cruz, emerge from the mountains, has a rainfall not regular enough for successful agriculture without irrigation. The ancient irrigating ditches, which can be traced for miles, show that the prehistoric

inhabitants applied a more extensive system of irrigation than any of their contemporaries in other sections of what is now the United States. The district required large irrigation undertakings; this meant coöperation and intelligent leadership; and hence there resulted "a sociological condition higher than any that existed among bands of hunters, fishermen, or even agriculturists depending on natural rainfalls." Coöperation in irrigation naturally encouraged the construction of other large public works, for defence, or storage, or ceremony. Thus the Casas Grandes originated. Dr. Fewkes believes that the abandonment of the Casas Grandes resulted from an invasion of nomads in prehistoric times, (and not, it may be noted in passing, from a change of climate). This whole study emphasizes once again the far-reaching consequences which hinge upon the all-powerful control of climate over human life, in so many of its activities, and customs, and in its development towards higher (or lower) standards.

R. DEC. W.

DIVISION OF THE MONTREAL RIVER. In a paper read by Dr. Robert Bell of Ottawa at the Twenty-second Annual meeting of the Geological Society, last December, he described a remarkable example of change in the destination of a large river in which the stream has been diverted in post-glacial times into a new channel that carries its waters all the way to its present mouth in a straight course of 90 miles, which lacks only 45° of being exactly opposite to that of the upper part of the stream, as well as its former continuation below the point at which the change took place; that is to say, at a certain point the course of the Montreal River (flowing into Lake Timiskaming) was turned round through an angle of not less than 135°, or from a north to a southeast direction, and made finally to discharge into the Atlantic Ocean instead of Hudson Bay. This singular occurrence was rendered possible from the fact that in one part of its course the river was barely able to pass across what has now become a low divide, and that a slow rising or tilting of the land to the southward gradually stopped the northward flow of the river, while at the same time the changing conditions induced a process of "stream-robbing" through a dam of loose drift material a short distance east of this increasing obstruction. The paper described numerous facts, which, taken together, seem to prove the manner in which this important and interesting phenomenon was accomplished.

THE UNITED STATES BUREAU OF MINES. The act establishing a Bureau of Mines in the Department of the Interior, approved May 16, 1910, became effective July 1. Carrying out the intent of the law, the Secretary of the Interior has transferred to the Bureau of Mines the investigation of mine accidents and fuels, together with the personnel and equipment of these investigations. The fuel investigations under the Geological Survey have already resulted in a better realization throughout the country as to the value of fuels. One result of this work is that nearly all of the fuel now purchased by the federal government is bought on specifications and subject to test by the Fuel division, or purchased after examination made of the coal supplied by the mines from which coal is delivered to the government. The publications of the Survey relating to mine and fuel investigations will in the future be distributed by the Bureau of Mines. The first of the Bureau of Mines bulletins, the Volatile Matter of Coal, by H. C. Porter and F. K. Ovitz, will be published in the next few months. These publications when issued can be obtained by addressing the Director of the Bureau of Mines, Washington, D.C.

SOUTH AMERICA

THE MONTAÑAS OF WESTERN BRAZIL. Mr. A. Lange, who has been travelling in the regions of the Upper Amazon, sent the following notes to the *Bulletin* from the River Javary:

"As Montañas are to be understood the forest regions on both sides of the Amazon River, especially south of the river. The regions which are framed in by the Javary River on the west, and the rivers Acre and Madeira on the south, are generally designated as the Montañas. They consist of forests of immense extent, through which numerous rivers flow, all of which empty into the Amazon. For more than six months of the year, these regions are partly under water, and at times are rendered uninhabitable. However, there are scattered all over, areas which are high enough to remain dry even at the highest river. These areas are few and valuable. It is here that people can build houses, thus forming communities whose size and commercial importance depend upon their accessibility and the local conditions. On the lower Amazon, these towns are not more than about 100 miles apart, but here in the remotest parts of the Amazonian affluents, they are few and very far apart (between 200 to 300 miles).

"Rubber is the product which absorbs all the energy of this country, and it is by far the most profitable. Without rubber the population would have no adequate resources. As long as the working of rubber pays the ordinary laborer as much as 40,000 Reis ($12) a day, he will not bother with cultivating the soil. For this reason, it can easily be understood that the valley or Montaña region will not otherwise be developed; not that the natural conditions are unfavorable, but simply because labor and energy are lacking. The seringueiro or rubber-worker must subsist upon imported canned goods, although the land upon which he treads could give him meat, vegetables and fruit in abundance, if only the labor and energy necessary to produce them were at hand.

"The owner of rubber land lives on some high point of the river front. He has a concession of a certain number of rubber land areas, often extending as much as thirty to forty miles along the river front, and from fifteen to twenty miles back in the woods. To work such an area a force of fifty to seventy-five seringueiros is necessary. Their work consists in cutting a path through the woods, locating the rubber-trees, tapping the precious milk, and smoking it and practically represents the extent of the present development of the Montañas.

"Although these forests contain incalculable quantities and varieties of trees, of superior quality for industrial purposes, yet their existence is hardly recognized and, at any rate, is not utilized. There are immense fortunes in valuable trees which are now simply rotting.

"The possibility that white planters will ever cultivate this enormously rich land is still very remote. Nature taxes the intruder in these forests so heavily that no one is willing to risk life or health for any product that will not give large remuneration in a short time. Malaria and swamp fever attack man, even though the utmost care be taken to protect him against the infectious bite of the mosquito. The so-called pium is a veritable plague, causing small hemorrhages wherever it bites. The mysterious and fatal disease Beri-Beri has greatly increased the mortality in these regions.

"Attempts, however, have been made by white settlers in the lower Amazon Valley to cultivate this extremely fertile land. At Santarem, about 400 miles from the mouth of the Amazon, a colony of Americans from Mississippi settled

shortly after the Civil War. The labor conditions then prevailing in Brazil, and especially the use of slaves, corresponded with the customs of their former home, and for years they successfully cultivated cacao and coffee. But after the abolition of slavery in Brazil, they found themselves deprived of their slave help and, gradually gave up their work and, to-day only the memory of this attempt of white men to cultivate the soil remains."

CLIMATE OF CHILE. The climate of Chile presents many peculiarities of interest. In the late Dr. C. Martin's *"Landeskunde von Chile"* (Hamburg, 1909) there is a clear account of the climatic features which have been of marked consequence in the economic development of the country. Distance from the ocean, and altitude, have almost more influence than latitude. Along the coast the marine control is so emphatic that the seasons become merged, and lose their normal characteristics. From Tacna to Copiapo is the arid portion, with five distinct climatic zones, parallel wth the coast, between the ocean and the Cordillera. The warm region is between Coquimbo and Curicó, with dry summers, necessitating irrigation, but with sufficient winter rainfall. The rainy district is in the provinces of Valdivia, Llanquihue and Chiloe, where heavy rainfalls, alternating with strong northwest squalls, are common. The Patagonian and Tierra del Fuegan portion is very rainy along the coast, but inland the rains are less marked as they move up the valleys. The upper valleys are dry, and the pampa to the east is almost rainless. Forest fires occur in the sub-Andine transition belt. Descriptions are given of the weather in different parts of Chile.

Such an account of Chilean climates as this one makes the section on climate in the recently published *"Handbook of Chile,"* of the International Bureau of the American Republics (1909) seem almost hopelessly inadequate. At the present time, when so much accurate information is available concerning the meteorological conditions of Chile, there is no reason why any publication, especially an official one, should give its readers so poor a discussion of climate as that contained in this Handbook. R. DEC. W.

AFRICA

SCULLING MATCH ON THE ZAMBESI. The results of the sculling match on the Zambesi river, for the championship of the world, on Aug. 18, were known in every land on the following day, illustrating again the rapidity with which things are moving in Africa. Only a half dozen or so of white men had ever seen these falls, fifteen years ago, though Livingstone discovered them in 1855. Now, trains carry to them throngs of tourists who find sumptuous entertainment, at tip-top prices, while they utilize the many conveniences provided for comfortable inspection of this wonderful cataract.

The race was rowed a little above the falls, for the Victoria Falls of the Zambesi have a peculiarity that is all their own. Fancy rowing a race a little above Niagara! The waters there surge and foam along at breakneck pace; but the Zambesi waters, similarly placed above the falls, are comparatively smooth and move with scarcely accelerated speed to the lip of the chasm. One of the great world rivers, the fourth largest of Africa's splendid waterways, a mile wide, moves placidly and quietly to the gorge, and there is dropped 400 feet. It is the most unique and one of the most colossal facts in stream hydrography.

On the waters where Livingstone floated safely down to the island over whose edge he peered into the chasm, this race was rowed. It was his burning en-

thusiasm, his sublime faith in Africa, that kindled the mighty movement which is bringing about the transformaton of a continent. But even Livingstone would scarcely have dreamed that, in a few decades, men would gather from other continents to witness a sporting event in the middle of Africa, between athletes of London and Australia at the great falls he discovered.

Is there Progressive Desiccation in the Sahara? Reports of progressive desiccation in different parts of the world, leading to a belief in climatic change, may often be explained as the result of a change in government, or of a change in the character of the local population. Thus, a government which lacks power and does not properly direct the activities of its people, or decreased enterprise and energy on the part of the people themselves in their efforts to keep back the advancing sands of the desert, may readily lead to what travellers take to be signs of a progressive change of climate, from wetter to drier, resulting in the abandonment of the region by its inhabitants. A situation of this sort was described by Mr. Hans Vischer, before the Royal Geographical Society, in an account which he gave of a journey from Tripoli across the Sahara to Lake Chad. Ruined towns, monuments of ancient art and industry, prehistoric stone implements, and a few struggling villages where there are water-holes, show "the various stages of man's struggle against nature, and the unavoidable end—the dead and waterless desert." When man retreats, and the desert is left alone, the sands claim everything, just as the tropical forest covers the ground when man ceases to cut down the trees and bushes. The history of the country between Tripoli and Fezzan shows that the desert does not drive man away, but claims any ground left by him. The advance of the desert is following on the depopulation of the country, and not on any change of climate. There is every hope that the advance of the desert may be stayed within the next few years. With a strong government in Tripoli the people will gain confidence in themselves; the Young Turk element is making itself felt; with French garrisons in Aïr and Bilma old trade routes will be reopened, "and the oases will once more be held by men against the desert." R. DeC. W.

ASIA

New Meteorological Observatory in the Philippines. A new meteorological and geodynamic station has been established by the Philippine Weather Bureau in the town of Baguio, Benguet. The building is on an isolated hill, rising 216 feet above the Baguio plateau, whose altitude is 4,740 feet (mean). Construction was begun in November, 1907, and completed in September, 1909. The building serves a twofold purpose, as a sanatorium for the Mission of the Jesuits in the Philippines, and as a branch station of the Manila Observatory.

The first publication of the new observatory bears the date 1909. There is a summary report on the climate of Baguio, which "confirms the idea that Baguio is eminently fit to become the health resort of the Philippines and possibly of the entire tropical regions of the Far East." A previous report, "The Climate of Baguio, Benguet," appeared in the Annual Report of the Director of the Philippine Weather Bureau for 1901-02. The present report summarizes all available data up to the present time.

The equipment of the new Observatory comprises two anemographs, two mercurial barometers, a barograph, Marvin electric heliograph, Campbell sunshine recorder, electrically registering rain gauge, the usual thermometers; Piche evaporimeter; Richard psychrograph. There is also a microseismograph (Omori type). R. DeC. W.

EUROPE

POPULATION OF THE NETHERLANDS. The census of Dec. 31, 1909, gives the Netherlands a total population of 5,853,037, which is an increase of 1.38 per cent. in the last ten years. There are 2,896,154 males and 2,956,883 females. The density of population is 177 to the square kilometer. The population of the largest cities is Amsterdam, 566,927; Rotterdam, 415,168; Haag, 272,887; Utrecht, 118,877; Gröningen, 74,596; Haarlem, 68,244; Arnheim, 64,167; Leiden, 58,263. Of the total population, 4,114,759 live in towns. This is 70.3 per cent. of the inhabitants, while the agricultural populatjon forms only 29.7 per cent. of the total.

NEW MAP OF SICILY. The representative of the Military Geographical Institute in Florence announced at the recent meeting of the Eighth Italian Geographical Congress, at Palermo, that a new survey of the whole island of Sicily has been planned and triangulation is already under way. The work will be carried out on a scale of 1:25,000.

COLD SPELLS IN EUROPE. In the eastern United States we are so accustomed to the movement of our cold waves in an easterly direction, and to their association with northwest winds, that many persons are surprised to find that in Europe the cold usually comes from the northeast, and progresses towards the southwest. This is the natural result of the presence of the cold continental area to the east and of the warm ocean area towards the west. A study of several cold spells during the winter of 1908-09, in Central Europe, by Dr. A. Fessler (*Meteorol. Zeitsch.*, Jan., 1910), brings out very clearly the general conditions which are associated with several typical European "cold waves," using the word in a general sense. The progress of the 32° F. isotherm between October 16 and 23 shows most strikingly the movement from northeast to southwest, the water areas on the north and the mountains on the south serving as checks to the advance of the low temperatures in those directions. The winds were distinctly northeast throughout the cold area. Obviously, this was a clear case of imported cold, although local radiation played a part, locally, in lowering the temperature, and in lengthening the period of cold. A further study, of the "cold waves" of November and December, 1908, and of January, 1909, shows that they were all associated with an area of high pressure over the continent, which moved slowly towards central Europe, with easterly and northeasterly winds blowing from Asia and from Russia towards central Europe. In one of these cases, there was no cooling by local radiation, as the sky was continuously cloudy, with fog and rain. In another case, the cold was chiefly produced by local radiation. And in still another case, of a very different sort, there was active air movement from the northwest, with an initial lowering of temperature resulting from importation, followed by considerable cooling due to radiation. There seem, therefore, to be these three types of cold weather: (a) cooling by importation from the northeast, plus local radiation; (b) cooling by local radiation; (c) cooling by importation from the northwest, plus local radiation. R. DEC. W.

POLAR

CAPTAIN BERNIER'S ARCTIC WORK THIS YEAR. Capt. Bernier, the Canadian Polar navigator, is now supposed to be in Canadian Arctic waters, with the Government's permission to attempt the Northwest Passage and bring his vessel around to Victoria, B. C. He sailed from Quebec on the steamship *Arctic*, in

June last. A letter received from him at the Department of Marine, dated Chateau Bay, Labrador coast, July 12, included this memorandum giving the programme of his two years' cruise, as follows:

From Chateau Bay he proposed to sail for Albert Harbor, Pond's Inlet, on the north shore of Baffin Island; thence he meant to proceed to Beechy Island, at the western end of Lancaster Sound. The next place of call would be Dealy Island, in Melville Sound, and then Winter Harbor on Melville Island, at the entrance to McClure Strait. From there he expects to complete the Northwest Passage to Herchel Island, next year, where the Arctic sealing vessels have headquarters. The remainder of the trip around Bering Sea to Victoria will be comparatively easy sailing.

Sunburn and Frostbite in the Antarctic. In Lieut. Shackelton's account of his South Polar Expedition he says it was quite a common occurrence to feel one side of the face freezing while the other side was being sunburned. The Manchurian ponies would have frozen perspiration on their coats on the sheltered side, while the other side was kept dry and hot in the sun. On Dec. 4 the men were marching stripped to their shirts, and were much sunburned, although at noon that day the temperature showed "10° of frost." These observations recall the note made by Scoresby, many years ago, regarding the difference between the sunny and shady sides of his vessel in the Arctic. Scoresby pointed out that the pitch bubbled in the seams of the deck in the sun, while, in the shade, the side of his ship was covered with ice. R. DeC. W.

PHYSICAL GEOGRAPHY

Tidal Results on the Pacific Coast. An extended series of tidal observations was obtained by the Canadian Tidal Survey during the summer of 1909, under the personal supervision of Dr. W. Bell Dawson, the Superintendent of the Survey. There were in all a series of twenty recording tide gauges in simultaneous operation along the coast of British Columbia. These were placed at carefully selected points with a view to utilizing them as a basis for the determination of tidal differences at intermediate places; and also to define the extent of the region which can be referred to each of the principal tidal stations for which tide tables are published. The results of these investigations, when reduced to practical shape, will appear in the Tide Tables for 1910. The tidal data for New Westminster, Frazer River, and for Port Essington, Skeena River, appear in "Notice to Mariners, No. 32, 1910." They afford examples of the general question of the progress of the tide in ordinary shallow estuaries, and in deep inlets. They are in no sense, therefore, of merely local interest or local application, but illustrate the rate of progress of the tide relatively to the depth of the channel or inlet.

GENERAL

Prof. George D. Hubbard, who has had charge of the work in Physiography, at the Ohio State University, for the past five years, has resigned that position to go to Oberlin College, Oberlin, Ohio, where he will have charge of the department of Geology.

Proposed Reform of the Calendar. The Society has received the following from Mr. Fritz Reininghaus of Zürich:

"I recommend the following reform of the calendar:

"The division of the year into twelve entire and two-half months; all entire

months to consist of 28 days, and the half-months of 14 days. The first of the two half-months will be placed at the end of the first half year, and will be known as the Summer half-month; the second half-month will follow the last month of the year, and will be known as the Winter half-month.

"The 365th and the leap-year's day will be placed at the end of the year, and will be quite independent of the week or month, so that these days will neither have the name nor the date of a week-day.

"I had at first expressed the idea (which I thought quite new) of dividing the year into 13 months of 28 days each; but it has come to my knowledge that this proposal had already been advocated by Auguste Comte, the philosopher, who died in 1857. After consideration, I would advise the above-mentioned division as being more practical.

"The advantages of such a calendar would be as follows:

"Each day of the week would be in its fixed and unchangeable place in the future.

"Each month would begin on the same week-day, this also applying to each year, each half-year and each quarter of the year.

"This division would make the week and month measures of time, because the units 'year' and 'month' would, by this means, become, with an insignificant difference, complete multiples, always equal, of the time-unit 'week,' which is not the case at present."

Mr. Reininghaus has also sent a fuller explanation of his proposition in a pamphlet entitled "Kalender-Reform Vorschlag."

INDEX TO METEOROLOGISCHE ZEITSCHRIFT. Everyone who has to do with meteorology or with climatology will always find the *Meteorologische Zeitschrift* an absolutely indispensable source of information. It is the authoritative meteorological journal of the world. The use of this journal has been very greatly facilitated by the recent publication of an author and subject index, covering the period 1884-1908, *i. e.*, twenty-five volumes (Braunschweig, 1910, Friedrich Vieweg und Sohn). Those who use this index are pretty certain to miss no important publication issued during the period in question. The index includes all titles listed in the bibliography, although these may not have been noticed or reviewed in the text. R. DEC. W.

HALLEY'S COMET. All observers seem to agree that the earth did not pass through the tail of Halley's comet, as it had been predicted it would do, on or about May 18. Mr. Knox Shaw, in No. 4418 of the *Astronomische Nachrichten*, says that the tail was only 8° wide when observed on May 18, and its increased breadth next morning suggests that it was bent back in the orbit and probably did not begin to sweep past the earth before 12h., Greenwich mean time, on May 20. At this time the earth was some four million miles south of the comet's orbit plane, and consequently the tail probably passed well to the north of the earth, for the Helwân observations, during May, suggest that it was not nearly wide enough to envelop the earth at that distance. They also show that its length was well over 20,000,000 miles, and would therefore have enveloped the earth if the planes had coincided. No sign of the comet's transit of the sun's disc was observed, although observations were made with the 4-inch Cooke equatorial.

SLEEPING SICKNESS. *Petermans Mitteilungen* (11 Halbband, 2 Heft, 1910) has a map showing the geographical distribution of sleeping sickness and illustrating an article on the subject by Dr. G. Meyer. The map is based upon those published by the British Sleeping Sickness Bureau (Oct., 1910), which is active both in investigation and publication. The thirteenth *Bulletin* of the Bureau (Royal Society, London, 1910), begins the second volume of this useful publication. The *Colonial Reports* (Miscell., No. 65, Dec., 1909, London), have a "Report on the Measures adopted for the Suppression of Sleeping Sickness" by Dr. Hesketh Bell, in which he gives an historical account of the progress of discovery and research, and a summary of the results gained, with regard to sleeping sickness. *Nature* (May 5, 1910) in a summary of this paper, says that the researches of Kleine and Bruce have shown that the trypanosome of sleeping sickness goes through a developmental cycle in the tsetse-fly, and that once the trypanosome has established itself, the fly remains infective, apparently for the rest of its life, without again feeding on the blood of an infected person. It follows that the period for which healthy persons must be removed from the fly belts, in order to insure that infection has died out in the flies, is much longer than was thought, and cannot at present be stated definitely. There are two other possibilities that complicate the problem of the transmission and spread of the disease. One is that an infected tsetse fly may transmit the infection to its offspring. The other, that some vertebrate animal other than man may harbor the trypanosome of sleeping sickness in its blood and so be a "reservoir host" which keeps up the infection in the flies. Further, to keep the natives, probably much against their inclination in many cases, more than two miles from the shore along the immense coastline of the Victoria Nyanza is a task of considerable difficulty. The natives are evicted from homes which they and their ancestors have inhabited for untold generations and moreover, most of them are sceptical as to the agency of the tsetse fly in the transmission of the disease. It is therefore probable that in spite of administrative prohibitions, some natives evade the regulations against frequenting the danger zone.

As to the distribution of the disease in Africa, at the present time, it extends on both sides of the Equator about half way to the tropics, from the Atlantic eastward to Victoria Nyanza and Lake Tanganyika, and it has already appeared on the northern shores of Lake Nyasa. It is claiming victims in the islands of Principe and Fernando Po, Gulf of Guinea. The most southerly point it has yet reached on the coast of the mainland is Benguella, Angola. While the stamping out of the terrible disease is not yet in view, there are some hopeful indications. It is said that a majority of the mild and some of the severe cases are now cured by the Atoxyl treatment. For a long time, it seemed as though everyone afflicted with the disease was doomed.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

Across a Continent in a Man-of-War. Being the Log of Commission of H. M. S. "Pelorus," 1906-1909. With a full account of her cruise of 2,000 miles up the Amazon. By E. E. Highams. xvi and 239 pp., 38 plates from photographs, sketch map, table of distances and index. The Westminster Press, London, 1909. 5 s.

Only 36 pages in this small volume are devoted to the "full" account of a voyage "across a continent in a man-of-war." The attractive title must be called somewhat misleading. On the other hand, it is a pleasure to find here correct statements, all the more impressive because they are brief and artless, in regard to the climate and accessibility of the chief towns of the Brazilian State of Amazonas and eastern Peru. The *Pelorus,* a cruiser of the third class (length 300 feet, breadth 36½ feet, displacement 2,135 tons), was the first British warship that ever went up the Amazon to Iquitos, 2,037 miles from Pará. The only difficulty experienced in navigating the great river is referred to under date of Saturday, February 6, 1909: "Got under weigh [way] at six o'clock and proceeded [up stream from Jacaretuba, about 38 miles west of Manãos] at the usual speed against a strong current, the course having to be altered incessantly to avoid the logs with which the river abounds at this time of the year. These are very dangerous to the ship, and the propellers are also liable to get foul and broken by striking the débris which is torn from the banks by the current." Nothing whatever obstructed or impeded either the routine of physical drill on board, morning and evening, or the athletic sports—the rowing and cricket matches, the tennis, tug-of-war, football, and even golf—that kept officers and men in good humor and good health. The climate is characterized as "hot and very damp," yet it has no terrors for such a well disciplined ships' company.

The author says that the voyage, almost to the foothills of the Andes and back again, was a "very pleasant trip on the Amazon of 4,000 miles, and extending over six weeks, during which time we were very cordially received and fêted by all with whom we came in contact, and who, at the different ports, tried to outdo each other in their hospitality by showing their appreciation of our visit to their waters . . . Very little sickness was contracted during the journey, and there were no fever cases; the only drawbacks being the mosquitoes and [other] insects, which swarm aboard and rob one of a good deal of rest at night, and the very exorbitant price of food-stuff, due to the duty imposed, which is very high."

MARRION WILCOX.

Daniel Boone and the Wilderness Road. By H. Addington Bruce. 8vo. xiii and 349 pp. The Macmillan Company, New York, 1910. $1.50.

Books about this great pioneer-explorer are always welcome, for we are glad to be reminded, time and again, of the noble quality of the man and to hope that his tribe may increase. Like all unselfish men, he was pretty badly treated by his compatriots of the period, but this is a story so often told that it is hardly worth passing mention. The human coyotes got their chance under cover of law, and Boone being a large-minded, law-abiding character, they succeeded as soon as lawyers had to decide matters on technicalities. Thus it was that after years of devotion to the country which he opened up with fearless energy and where he justly claimed some land, he found himself "burdened with debt, without a yard of land to his name, and pauperized."

The author tells of occurrences through Boone's active life and correlates them with other events of the time. This gives the reader an opportunity better to judge of the remarkable exploits of the great hunter than if the references to other figures of the time had been curtailed.

Deprived of his property, Boone left his old battle-ground, being no match for commercialism, and settled in Spanish territory, now the State of Missouri, where 850 acres were given to him and he was made a magistrate. His countrymen still pursued him. The region was added to the Union, and once again, and this time in his old age, he was pauperized through technicalities. But the Kentuckians began to realize who Daniel Boone was, and the intercession of the Legislature of that State caused Congress to take action which somewhat mitigates the blush we feel to-day. Boone's claim was confirmed; but heroes do not always live to be 75. The author gives the story to the end, which came at Femme Osage in 1820, Boone then being 86, and having witnessed the success of his brethren of the wilderness, Lewis and Clark, and the opening of the new West by the fur hunters who followed.

The Government of North Dakota. By James E. Boyle, Ph.D. xcv and 320 pp. American Book Company, New York, 1910.

A book written for schools but as full of information as a cyclopedia. The text is not confined to North Dakota, but reviews the whole scheme of American government, Federal, State and local, particular attention being devoted to the last. A statement of the nature and principles of government opens the book, the rise of American institutions is then sketched, and a general analysis follows systematically. In the appendix are the Articles of Confederation, the Constitution of the United States, the Enabling Act, Constitution of North Dakota, etc. Prof. Boyle's parents were pioneers in Kansas and he is able to see things from a Western standpoint which generally means breadth of view.

Traité de Géographie Physique. By E. de Martonne. Parts 3 and 4. Armand Colin, Paris, 1909 5 frs. a Part.

The first three parts of De Martonne's treatise, and the introductory chapter of part 4 (comprising Sections 1 and 2 as published) were reviewed in the July *Bulletin* (p. 533). In Section 3 the cycle of stream erosion is first discussed and the principle of physical evolution here set forth is kept in view throughout the remaining chapters on landforms. The discussion of entrenched meanders (pp. 431-436) is open to criticism, inasmuch as the author, attempting to prove that meanders of this type cannot result from the incision of normal river meanders following uplift of the region, bases his arguments on the erroneous

assumption that meanders incised after uplift would be cut vertically downward and so would not show the steep "under-cut" and gentle "slip-off" slopes which actually characterize entrenched meanders. A consideration of the laws of meander migration would show that spurs enclosed by entrenched meanders must have asymmetrical slopes, whether the meanders develop during the normal down-cutting of an irregular stream in its first cycle, or are inherited from a previous cycle in which the meanders were well developed.

In the chapter on the influence of rock character upon earth sculpture, we have an unusually full consideration of the effects produced by the mechanical and chemical composition of various rocks upon landforms. Much needed emphasis is placed upon details of sculpture of wide-spread occurrence, but little treated in most works on physical geography. Our admiration is qualified, however, for a classification of rocks (pp. 447-451) which makes all metamorphics altered sediments, which has no place for altered igneous rocks, and which gives the student the idea that gneiss is ordinarily the product of contact metamorphism induced in a layer of sediment by an igneous intrusion, leaves much to be desired.

On pages 474-475 we find the Grand Canyon of the Colorado and the platform in which it is cut described and figured as two strikingly different features produced in one cycle of erosion because of difference in rock resistance. As authorities for this interpretation the author quotes Davis, and Huntington and Goldthwait. Yet a large portion of Davis's paper is devoted to proving that the features in question cannot be regarded as the results of one cycle of erosion; and the paper by Huntington and Goldthwait names, describes and figures the two different cycles represented by these features. The description of a platform in the depths of the canyon (p. 475) also appears to be based on a mistaken reading of Davis's paper.

The influence of geological structure on relief is the subject of a chapter in which faults and folds are described and their topographic expression discussed. A chapter on volcanic forms is introduced by a few paragraphs setting forth the geographic interest of volcanoes, and concluded by an account of the geographic distribution of these forms. The author next discusses the evolution of landforms and the development of drainage patterns, topics already considered to some extent in previous chapters. Especial emphasis is laid on the development of drainage on coastal plains, and on the evolution of fault scarps and folded mountains. The Hurricane Ledge in the Colorado Plateau is cited (p. 558) as an example of a fault line cliff facing the up-thrown block, giving a reversal of the true fault topography; Huntington and Goldthwait are quoted as authorities. Here again the author seems to have misread the paper from which he quotes, for Huntington and Goldthwait, in common with other students of the region, have shown that the Hurricane Ledge faces the down-thrown block, and in the region especially studied is a true fault cliff of comparatively recent date.

A discussion of "paleogeography" is of doubtful service in such a treatise as the one before us, and it does not appear that the chapter on this subject adds to the value of the book. "Glaciers and glacial topography" furnish material for an interesting chapter which shows that the author is pretty well convinced of the efficiency of glacial erosion. In discussing "aeolian action and desert forms" the attention is directed to need of appealing to normal stream erosion for many features found in desert regions. That the discussion

of "Shoreline Topography" is far from satisfactory will be apparent from an inspection of the author's classification of shorelines (pp. 697-706) which makes distinct classes of (a) embayed coastal plains, (b) embayed coastal plains with bay bars and lagoons, (c) embayed coastal plains with bay bars and marshes; but has no place for shorelines on uplifted coastal plains.

The remainder of the work, pp. 711-862 is devoted to the subject of "Biogeography." There may be differences of opinion as to the wisdom of including this subject in a treatise on physical geography, but the reader will find much to interest him in the abundant illustrations of geographic control here set forth. The physical features which most affect the distribution of plants and animals, and the general facts of such distribution are quite fully discussed.

Among the admirable features of De Martonne's work are the large amount of the new material drawn from a wide range of reading, the full list of references appended to each chapter, the excellent photographic illustrations, the effective drawings by the author, and the clear manner of presentation. Among the defects are the lack of emphasis, throughout much of the work, of the human aspects of the science, the inadequate treatment of shorelines and certain other types of landforms, and the evidence of careless reading of authorities quoted. In spite of these defects, the reader will find De Martonne's treatise a most valuable and interesting book. D. W. J.

Land und Leute Monographien zur Erdkunde. Herausgegeben von A. Scobel. Verlag von Velhagen & Klasing, Bielefeld und Leipzig, 1900-1910:

3. Norwegen. Von Prof. Dr. Sophus Ruge. Zweite Auflage bearbeitet von Prof. Dr. Yngvar Nielsen. 151 pp., map, 119 illustrations, and index. 1905.

5. Die Schweiz. Von J. C. Heer. 197 pp., map, 181 illustrations, and index. Third Edition, 1907.

6. Oberbayern. München und bayerisches Hochland. Von Prof. Dr. Max Haushofer. 120 pp., map, 102 illustrations, and index. 1900.

7. Deutsche Ostseeküste. Von Georg Wegener. 168 pp., map, 150 illustrations, and index. 1900.

8. Deutsche Nordseeküste. Friesische Inseln und Helgoland. Von Prof. Dr. H. Haas. 176 pp., map, 166 illustrations and index. 1900.

9. Der Harz. Von Fr. Günther. 151 pp., map, 129 illustrations, and index. Second Edition, 1910.

10. Am Rhein. Von H. Kerp. 201 pp., map, 192 illustrations, and index. Second Edition, 1908.

11. Die Riviera. Von W. Hörstel. 176 pp., map, 160 illustrations, and index. Second Enlarged Edition, 1907.

12. Rom und die Campagna. Von Otto Kaemmel. 194 pp., map, 156 illustrations, and index. Second Edition, 1906.

13. Der Schwarzwald. Von Prof. Dr. Ludwig Neumann. 167 pp., map, 171 illustrations and index, 1902.

14. Berlin und die Mark Brandenburg. Zweite neubearbeitete Auflage von Felix Lampe. 211 pp., map, 147 illustrations, and index, 1909.

16. Dresden und die Sächsische Schweiz. Von Prof. Dr. Sophus Ruge. 175 pp., map, 148 illustrations, and index, 1903.

These volumes (large 8vo) are specimens of the geographical monographs, very beautifully produced, which the well-known map house of Velhagen &

Klasing has been publishing, for some years, under the general title of "Land und Leute." They are intended for popular reading and are sold at small prices. In no other sense are they cheap, for they rank among the best descriptive works on the countries of which they treat and they are certainly not surpassed by any other series of geographical monographs as specimens of fine book-making and in their perfect reproduction of well-selected photographs. Geographically, they are sound, as they should be, for the writers of these monographs are geographers whose work is well known, and not a few of them are among leading geographers of Germany, professors in the higher schools of the country and widely known for their contributions to geographical literature. Mr. Scobel, the editor of the series, is among the leading cartographers of the day. Each volume has a list of works on the country, a comprehensive index and a good map.

Les Warega. (Congo Belge.) Par le Commandant Delhaise. Avec une Préface de Cyr. van Overbergh. xx and 376 pp., map, plan and illustrations. Large 8vo. **Albert De Wit, Brussels, 1909.**

This volume is No. 5 in the valuable "Collections de Monographies ethnographiques" which are being published in Brussels. The present work describes a peculiarly interesting people of the eastern Belgian Congo. The Warega, living in the Great Forest, extend from the Congo River eastward, almost to lakes Tanganyika and Kivu, mainly between 2° and 3° S. Lat. The forest has isolated them and they have fortunately escaped prolonged contact with the Arabs. They are a fine tribe, pure in blood, practicing polygamy only in moderation, once cannibals but eating human flesh no longer, unspoiled children of the forest whose degree of civilization may be measured by the respect in which they hold women, in which regard they have a place of honor among African peoples. They travel little and live contentedly on their clearings or on the small areas of grass land that are scattered through the wide forest. Their most conspicuous industrial attainment is in iron smelting and working, in which they are skilful.

Commandant Delhaise, who was stationed among the Warega two years (1906-7), has dispelled the mystery that involved this unmolested and comfortable people. His large book gives a systematic and complete description of the tribe and its country. A considerable number of photographs, at the end of the volume, are referred, by numerals, to various parts of the text. There are plans of a Warega village and of Micici, the chief government post; also a black and white map of the country. The soil is well adapted for the production of many crops and European vegetables of all kinds are raised at the colonial stations.

The Valley of Aosta. A Descriptive and Historical Sketch of an Alpine Valley noteworthy in Story and Monument. By Felice Ferrero. xvi and 336 pp., 3 maps and 39 illustrations. 8vo. G. P. Putnam's Sons, New York, 1910. $2.

This beautiful Italian valley is not yet very well known to American tourists. It runs up into the Alps from a point not far to the north of Turin, and it is claimed for it that it contains the best Roman ruins outside of Rome and Pompeii, besides scores of mediæval castles that are well worth visiting. The valley, with its ramifications, also leads up to the highest peaks of the Alps. All who

visit it go there with this purpose distinctly in view, for the valley is not on an international line of transit.

Mr. Ferrero divides his book into three parts according to time. The first part deals with the valley as it is now, the second, with the valley of the Roman era, and the third, with the valley as it was in the Middle Ages. The treatment throughout will be found most helpful to visitors. The book is neither superficial nor ponderous. It is both readable and informing. The most casual observer, if intelligent, desires such help as the book will give him to see, appreciate and enjoy the valley of to-day; no less does he need the bits of history and description that will augment his enjoyment and understanding of the splendid Roman ruins and the works of the Middle Ages. The illustrations are admirable.

Mr. Ferrero tells of the ascents of the high Alps from the southern side, achievements that are much less known than those of the northern approach. He says that the Gran Paradiso is the last stand of the ibex among European mountains. It once roamed throughout these mountains, and fifty years ago there were still enough left to permit free hunting. It is now forbidden to hunt the remnant remaining, estimated at about 600, and the Italian Government deputes their protection to some forty hunting guards.

Geography of the Middle Illinois Valley. By H. H. Barrows. xii and 125 pp., 16 plates, 47 figs., and index. *Bull.* No. 15, Illinois State Geological Survey, Urbana, Ill., 1910.

The appearance, a few years ago, of two now familiar books on the influence of the physical geography upon the history of North America was followed by a wave of appreciation from historians as well as geographers. It was asserted that at last we had begun to cultivate a great field of research, but the authors of these stimulating books, no less than the critics, were aware of their very general nature and of the tremendous task to which they were but the invitation. Certain exaggerations, however, crept into our geographic speech. A great truth had been discovered at last; history would have to be entirely rewritten; the touchstone in the study of all human development everywhere is geographic influence. It required the piercing through again and again—chiefly by historians—of these bald generalisations to make us see that they were but the ghosts, so to speak, of an idea often asserted in the past and as often denied, because too little detailed and too much general work on the problem had been done. When a student actually put his hands to a concrete task involving the relationship of geography and history the ghost was promptly laid, at least for him.

All this does not mean that the idea of geographic influence in human development is abandoned; for it never stood on a firmer basis. We have merely arrived at the stage where there is no bone to our contention. The historian grants geographic influence: he only wants us to consider other factors, sometimes of more, sometimes of less, but always of some importance. When we deal with the facts of a people's development we deal with time as well as with space, and time involves many facts of human origin, ultimately of geographic origin, it may be, but so long and so far removed from earth forces that their preservation, present use, and relationships, are in the nature of history, because they are matters not of observation but of long and, oftentimes, of involved record. One can not prepare a complete account of human develop-

ment on the basis of field observations alone; the arduous, prolonged examination and analysis of books of record are also required. We who ourselves clamored for a well-balanced history in which the geographic factor should find a place were the first to forget the importance of some of the biggest non-geographic factors.

The second stage of development of the historico-geographic field has now been entered. Students are working up the facts and laws of the evolution of the people of a small tract, with due attention to all the recognisable factors, before setting their hands to a continent.

The "Geography of the Middle Illinois Valley" is, in the reviewer's judgment, the most important work of its kind yet published in America. The first half of the book deals with the physical geography of the area, the second half with its settlement and development. The work shows as intimate a knowledge of history as of geography—a rare condition. It nowhere vaguely generalizes, nor generalizes at all without first showing precisely where and what the historic basis is. Yet neither the record nor the analysis is ever lost in mere detail. The style is clear, and the whole treatment sequential, scholarly, genuine. The educational bulletins of the Illinois State Survey are all of high grade, but we believe that there is not among them another so solid and praiseworthy as this.

It is shown that the Illinois Valley has formed in the past the greatest natural highway between the Great Lakes and the Mississippi. Explorer, fur-trader, settler, all alike were guided by it. Even to-day the counties bordering the Illinois River and the Illinois-Michigan canal contain 51% of the people of the State. The southern part was settled from the South and Southwest, the northern part from the Middle Atlantic States and New England. The southern wave seemed likely at one time to become the dominating one, owing, among other things, to the navigable streams, the highways of the pioneer, that here border Illinois, and to others that lead naturally from east to west. With the opening of the Erie Canal in 1825, the later development of steam navigation on the Great Lakes, and the decline of shipping and agriculture in New England, immigration into northern Illinois actively began, but not until the movement from "the land-hungry, agricultural South" had gained great headway. The fear that the State would be dominated by southern institutions and ideals caused Congress as early as 1818 to place the northern boundary, not on the parallel of the southern end of Lake Michigan, as originally intended, but north of it, so as to give it a 50-mile water frontage, and thereby invite northern settlers and political influences through closer commercial relations in that direction. Steam navigation on the Great Lakes was the greatest influence in bringing settlers to the doors of the State. From 1840 to 1850 Chicago grew 700% and from 1836 to 1846 its imports increased over 500%. Goods could be shipped north as well as south from the central Illinois valley. A choice of markets—St. Louis or Chicago—was now afforded, and agricultural expansion became extremely active. Of great interest is the history of steamboat navigation on the Illinois River itself. In 1833 there were three boats on the river; in 1850 there were 1286; in 1852 there were 1800 arrivals of steamboats at Peoria. With the cheap and extensive building of railroads over the flat prairies steamboat navigation on the rivers declined. Many towns fell into decay. Only those continued to grow rapidly whose positions were favorable from the standpoint of the railroad, or whose natural advantages were of a special order.

The New England farmer conquered the prairies before the southerner did.

A rough stratification of settlers followed. Tongues of southern influence extended north along the timbered lowlands and valley slopes and the timberless terraces on the valley margins, while the northern settlers pushed south over the intervening interstream prairies. Prairie development was, however, only actively begun when the railroad permitted freer cross-country transportation, for the earliest settlers had, perforce, to locate at least within striking distance of the river in order to get their goods to market.

The last important phase of development is related to canal construction across the State, which brings the discussion down to the Lake-to-Gulf Deep Waterway. Lack of space forbids even the mention of many other features of equal importance. It is a matter for heartiest congratulation that so excellent a piece of work has been done, and we earnestly hope for other papers of a like sort from the same source. I. B.

The Log of the "Laura" in Polar Seas. A hunting Cruise from Tromsö, Norway, to Spitzbergen, the Polar Ice off East Greenland and the Island of Jan Mayen in the Summer of 1906. Kept by Bettie Fleischmann Holmes. 137 pp., many illustrations from photographs, map, game list and meteorological table. Small 4to. The University Press, Cambridge, 1907. (Not in the trade).

A very handsome book recording, with vivacity and enthusiasm, the adventures of a hunting party from Cincinnati, including two ladies. Few keen sportsmen know much of the pursuit of game in such out of the way hunting grounds and the author is to be commended for the pains she has taken to explain and describe all that is of novel interest. The photographs are especially fine and chiefly illustrate hunting and ice fields.

Quer durch Abessinien. Meine Zweite Reise zu den Falaschas. Von Dr. Jacques Faïtlovitch. xv and 188 pp., 60 illustrations from original photographs and map. M. Poppelauer, Berlin, 1910. M. 5.

Researches in Abyssinia, in the past twenty years, have clearly shown the important Jewish element in Abyssinian history and also that many Jews are among the present population. Their fathers, for many generations, have handed down to their children of to-day the faith of Israel. They are called by the preponderant Abyssinian population "Falaschas" which means "foreigners" and thus they are distinguished from the autochthonous inhabitants. They have preserved their racial characteristics and, to an important extent, their purity of blood though there has been considerable admixture with the indigenous peoples. Jewish blood is said to flow in the veins of the Empress Thaitu, widow of the late emperor Menilek II; and her husband took great pains to preserve the tradition that he was descended from King Solomon and the Queen of Sheba.

Dr. Faïtlovitch has been conspicuous as a student of the Jews in Abyssinia whose presence there was first revealed by the Scottish explorer James Bruce. Some of the more important results of Dr. Faïtlovitch's journey among them in 1904-5 have been reported in the *Bulletin* (Vol. xxxix, 1907, p. 62). The present book includes his discoveries at that time and also the results of his second journey in 1908-9. The volume embraces a large amount of detailed information and will undoubtedly be accepted, for a long time to come, as the authoritative compilation of facts relating to this interesting people.

Les Premiers Jours de la Turquie Libre. Lettres d'un Témoin. Par Camille Fidel. Publication du Comité de l'Asie Française. 77 pp. 8vo. Soc. générale d'Imprimerie et d'Édition levé, Paris, 1909.

The author travelled through Turkey and other Balkan countries, soon after the recent revolution in Turkey. He records his impressions of those countries and gives the views of leading men with regard to the new régime at Constantinople.

The Elements of Pilotage and Navigation. With Notes on the correction of Compasses. By Lieut. Maxwell H. Anderson, Royal Navy. 82 pp., diagram and maps. 8vo. J. Griffin & Co., Portsmouth (England), 1908.

Combines the elements of pilotage and navigation in small compass.

Land Teaching. A Handbook of Soils, Plants, Gardens and Grounds for Teachers and Cultivators. By H. E. Stockbridge, Ph.D. vii and 131 pp. and illustrations. Southern Ruralist Company, Atlanta, 1910. $1.

Written in the effort to bring country school children close to the land. A source of much information that may help teachers to teach successfully.

Aus dem unbewohnten Innern Islands. Ódádahraun und Askja. Von Heinrich Erkes. Mit einer Skizze des Gebirgsstockes Dyngjufjöli und der Askja. 64 pp., map and bibliography. 8vo. Fr. Wilh. Ruhfus, Dortmund, 1909. M. 1.50.

The description of the lava wastes of Ódádahraun and Askja, in the northeastern interior of Iceland, is reprinted from the *Mitteilungen* of the Dresden Geographical Society (Heft 9, 1909), with the correction of some errors and a few additions to the text. In Part 2, the author has translated into German various writings on the exploration of Askja.

Fernando Cortes and the Conquest of Mexico, 1485–1547. By Francis Augustus MacNutt, Translator and Editor of the "Letters of Cortes." xii and 475 pp., 6 maps, 14 illustrations, and index. G. P. Putnam's Sons, New York and London, 1909. $1.35.

An addition—a real addition—to the valuable "Heroes of the Nations" series, this volume contains an account of the events in Mexico during the first part of the sixteenth century, together with estimates of the so-called Mexican "civilization" and a review of the career of Cortes from his birth, at Medellin in Estramadura, to his death, at Castelleja de la Cuesta, near Sevilla. The author's reasonable view of the writings of his predecessors in this field may be suggested by a citation from pages 53 and 54:

"Between the dazzling word-pictures of Prescott and Helps, on the one hand, and, on the other, Alaman's depressing sketch of a squalid town of hovels, inhabited by bloodthirsty cannibals, there is still room for a beautiful city, in which dwelt a sovereign amidst surroundings of interesting splendor.

"An entire school of present day investigators rejects the descriptions of Mexico given by the early writers as entirely fanciful, and asserts that the city presented few points of superiority to an ordinary Indian pueblo of New Mexico or Arizona. Repudiation of what has come down to us from numerous observers, who contradict one another about almost everything else, but were in

general accord concerning the aspect of the capital, its arts and degree of civilization, assumes the existence of something resembling a conspiracy of misrepresentation among the early Spanish writers.

"Even without conscious intention to mislead, it was inevitable that the Spaniards should fall into exaggeration in describing the city of Mexico: first, because they necessarily used the same terms to portray what they saw as they would have used in describing Rome, Paris, or Constantinople; second, because the contrast between such Indian towns as they had seen and the capital was undoubtedly very great, and their long years of rough life, perilous voyages, and the absence at times even of shelter from the elements, made any large town where some system of order reigned and where there were houses having court-yards, gardens, and embroidered hangings, seem worthy to be compared with great cities elsewhere seen and dimly remembered; and lastly because Mexico was unquestionably a very beautiful city."

That is an acceptable opinion, and it is expressed in terms of respectful consideration of the sensibilities of "present-day investigators," and with equal regard for the reputations of the three principal sixteenth-century authorities. Behind Prescott and Helps stand, of course, Las Casas, who wrote of what he himself had witnessed; Gomara, who "only began his 'Cronica de la Conquista' some twenty-five years or more after the events . . . and under the inspiration and direction of Cortes, then Marques del Valle, whose chaplain he had shortly before become"; and Bernal Diaz del Castillo, who fought shoulder-to-shoulder, valiantly, beside Cortes, and wrote his "true" history in order to correct Gomara's misstatements. The author of this most recent work in the same field has succeeded in steering a middle course between such extremists as Gomara, the old apologist for Cortes, and Señor Alaman, whose unquestionable talent has been enlisted for the much-needed work of destructive criticism.

The extraordinary interest of the old version has been retained in the present work. On the other hand, the influence of what might be called the "new learning" is shown in the cautious acceptance or discreet rejection of some striking features, episodes, and details of the story of the conquest or the descriptions of Montezuma's "empire." The weak, easily misled Mexican ruler, upon whose superstitious fears Cortes played so successfully, had been, it will be remembered, chief of the priesthood, before he became chief of the state and supreme director of the national defense. Therefore the glimpses which are afforded of the national religion, with its abominable rites (including human sacrifices and cannibalism) have a value that cannot be overlooked, although that part of the subject may seem most repulsive. The native warriors would not avail themselves of such opportunities as were presented from time to time during prolonged hostilities to kill their enemy, who seemed to them a godlike person—if not actually one of the gods. Their ambition was to take him alive, in order to sacrifice him on the altar of their "old established" monstrous deity, Huitzilopochtli, the god of war, whose image (compare Bernal Diaz) is thus described:

"Its face was distorted and had terrible eyes, the body was covered with gold and jewels, and was wound about with the coils of golden serpents; in the right hand was held a bow, and in the left a bundle of arrows. Suspended from the idol's neck was a necklace of human heads and hearts made of gold and silver and studded with precious stones . . ."

And what was (to this most civilized, yet most barbarous, Amerind nation)

the true and inner meaning of such terrible rites? We rescue from a foot-note (pp. 18, 19), the following suggestion:

"This practice [sacrificing and devouring human beings] is traced by some historians to the tribe of the Mexi, which descended from Tenoch . . . Prisoners taken in war were the most highly prized victims, but, failing these, or for the celebration of minor festivals, slaves were easily bought, or were offered by their owners for this purpose. Small infants were also commonly sold by their mothers, and instances of free-born men offering themselves as victims were not unknown. The victims were frequently drugged, in such wise that they went unconsciously, or even willingly, to the altar. If a great festival, requiring many and choice victims, fell in a time of peace, war would be undertaken upon any frivolous pretext in order to procure the desired offerings. The warrior who had captured the victim in battle would not eat of the latter's flesh, as a sort of spiritual relationship was held to exist between them, not dissimilar to that of a sponsor and his god-child in Christian baptism—or even closer, for the flesh of the victim was considered also as the very flesh of the captor. The eating of this human body was not an act of gluttonous cannibalism alone, but was believed to have mystic significance, the flesh having undergone some mysterious transmutation, by virtue of the sacrificial rite, and to be really consecrated; it was spoken of also as the 'true body' of the deity to whom it was offered, and also as the 'food of soul.' None but chiefs and distinguished persons, specially designated, was permitted to partake of the sacramental feast, which was celebrated with much ceremony and gravity. If the victim was a slave, the rites were similar, but simpler." M. W.

Motoring in the Balkans. Along the Highways of Dalmatia, Montenegro, the Herzegovina and Bosnia. By Frances Kingsley Hutchinson. 341 pp., map, over 100 illustrations from photographs by the author, and index. 8vo. A. C. McClurg & Co., Chicago, 1909. $2.75.

The automobile being an innovation along most of the 1,483 miles traversed by Mrs. Hutchinson and her party, it made a decided sensation among the live stock on the way. The author, with characteristic Chicago enterprise, secured a photograph of a horse that had just dragged his vehicle over a stone wall in his frantic desire to give the strange machine the whole road. In the capital of Montenegro, the author was told that its ruler, Prince Nicola I, father of the Queen of Italy, was attending service in a certain church. "Will he let me take his photograph when he comes out?" she asked. The soldier merely shrugged his shoulders. But the Prince and his two daughters were duly snap-shotted as they were walking home, and the picture is the frontispiece of the book.

Mrs. Hutchinson is a vivacious writer, with a keen eye for the novel and the picturesque. The lands and peoples of the western Balkans are among the few new things left for the globe-trotter and the author writes about them, not only in an entertaining manner but also with the evident purpose of showing how much pleasure and profit may be derived from a visit to this little known part of Europe.

Aztecs and Mayas. By Thomas J. Diven. Two Vols. Vol. I. pp. 248. 12mo. The Antiquarian Company, Chicago, 1909. $1.

While this volume is written in a somewhat hetereogeneous and fantastic manner the author is serious and his conclusions in the main accord with those

accepted today by the majority of the ethnologists and archæologists of this country, and are stated in their works. In some passages he is extremely personal and derogatory. Any book must be lowered by this practice. He is also inclined to be dogmatic as, for example, when he says "no book on any subject should ever be printed larger than a duodecimo." Besides this is not pertinent to archæology.

Less than a third of the book is given to the Aztecs and Mayas, but as this is only the first volume the deficit may be made up in what is to follow. In delimiting the "Arizona field" as he terms the Pueblo region, he omits everything north of the Colorado and San Juan. It is true the many-storied house has not been found there, but the remains (house-walls, pottery, etc.), indicate the same level of culture and the same stocks, reaching at least as far north in Utah as the Pine Valley Mountains and the Pink Cliffs. The reviewer has found coil-made pottery on the Sevier far below Panguitch, and it is not improbable that ruins may be discovered in that neighborhood also. The "Arizona field" then should be limited on the north by at least the parallel of 39°, especially as the canyons of the Colorado, of the Green and of the Grand around and above their junction, as far as Gunnison Crossing, are all full of ruins. Indeed at present it is difficult to say where the northern limit may be. Pottery has been found at Salt Lake.

He refers to numerous perforated stones discovered in this field and endeavors to fathom some of their uses. Stones of a similar kind are found all over the United States. In Reykjavik, Iceland, is preserved an ancient loom, such as was used by the early Scandinavians, and it is a good example of a primitive loom, showing each thread of the warp drawn taut by a heavy stone tied to the bottom end through a perforation. As this was one of the earliest types of loom, the world round, and as the natives of this continent were primitive weavers on similar looms it seems probable that many of the perforated stones were used for this purpose. The more primitive the weaver the more irregular these weights would be.

The author declares himself not satisfied with this present work and says he was overwhelmed with other cares during its preparation. It is a pity he did not wait. As he says that his task has just begun with this book it may be wished that the succeeding part may be more consecutive in thought and free from aspersions.

In Closed Territory. By Edgar Beecher Bronson. xix and 299 pp., nearly 100 illustrations from photographs by the author, outline map of British E. Africa and index. A. C. McClurg & Co., Chicago, 1910. $1.75 net.

Mr. Bronson's hunting tour was through the same wild game regions visited, soon after, by Mr. Roosevelt. He spent thirteen months shooting there and tells the story of his many adventures with the art of the practiced writer. Though the book will especially interest those who love the wilds and the pursuit of its big game, it contains much that will profit the general reader. He says that the white settlers, stock raisers and farmers have already taken up about 12,000,000 acres on the high plateau of British East Africa. On account of the enormous quantity of big game, they find it difficult to maintain fences. There is a general feeling that the Government should cease to extend its protection of game over immense regions that are capable of development and changes in the game laws are now under consideration. Mr. Bronson adds: "Give the settler a free hand and a year or two will see easy shooting ended within seventy-five miles of the railroad."

The Conquest of the Missouri. Being the Story of the Life and Exploits of Captain Grant Marsh. By Joseph Mills Hanson. xvi-458 pp., map, 36 illustrations and index. 8vo. Chicago, A. C. McClurg & Co. 1909.

In the physical development of the United States certain men have been particularly identified with certain regions and the relation of their doings and observations, consequently, forms a basic part of our history. While the exploits of politicians and of soldiers are seldom overlooked, and often are credited with more value than they deserve, the isolated individuals dealing mainly with natural obstacles, with no oratory or bugle-blast to sound their victories, frequently vanish with little or no record of their doings. Sometimes they fall upon a biographer, and we are grateful to Timothy Flint, for example, for giving us the story of the Patties, to Dr. Peck for that of Daniel Boone; and to authors like the late Dr. Coues for reprints and analyses of obscure relations.

In the volume here noticed we welcome a recent addition to the list. It presents the career of a pioneer navigator of the Missouri who was a part of its history: Captain Grant Marsh. Mr. Hanson has performed a valuable service and he has performed it extremely well, making a book that is entertaining, graceful and accurate. In order to insure this latter quality, he submitted many of the chapters for critical reading to persons recognized as authorities on the subjects involved. Instead of giving Captain Marsh's story by itself, he has interwoven with it a great amount of contemporaneous history to round out the tale and properly adjust it to other events. In this way he comes to relate the sad story of the disaster on the Little Bighorn. This is very clearly told. Captain Marsh was in command of the supply steamer, *Far West*, which was in touch with the troops during the whole of the period, and brought out the first authentic news of the annihilation of Custer's command.

Before closing, a remark on the method of writing the name of the river on which the battle occurred may be in order. The author gives this *"Little Big Horn"* and the main river, *"Big Horn."* Though this is not uncommon, it should be discontinued. The river was named after the Bighorn mountain sheep, and the reference is to the animal, not to the horn. Consequently, it should be written "Bighorn."

The Picturesque St. Lawrence. By Clifton Johnson. xi and 253 pp., and 47 full-page photographs. $1.25. The Macmillan Company, New York, 1910.

Travelers along the St. Lawrence from Kingston to the Gulf will find this volume a valuable hand-book for the journey. After the opening chapter, which tells of the discovery of the river and the adventures of the early navigators, the description begins with a chapter on Kingston and the Thousand Islands. Historical and legendary stories of the various stopping places are introduced throughout the book. At Kingston the author begins his journey and proceeds down the rapids to Montreal, halting now and again to inspect a settlement or to interview a villager. Montreal and Quebec are treated in long chapters which summarize their eventful history and describe their charm for the tourist. The large tributaries of the river receive attention in several chapters; the romance of the Ottawa with the story of Daulac's glorious and fateful foray against the Iroquois; the Richelieu and the gateway to the south by the way of Lake Champlain; the St. Francis, highway to the Connecticut river, which "has known the wail of human distress at every turn in its winding

course," and in whose valley is found to-day the city of Sherbrooke, a picturesque and distinctly Canadian settlement near the Vermont border line; and finally the beautiful Saguenay, from its ancient fur trading center of Tadousac, now a resort for such as delight in noble scenery and good fishing, to Chicoutimi, the lumber yard of the north. The author hardly does justice to the lower stretch of the St. Lawrence; his scenic wonders culminate with the Saguenay. Many an excursionist will find, with the reviewer, that the Saguenay loses, by comparison, something of its wonderfulness if it be approached from the Gulf where the massive, towering Percé Rock on Gaspé peninsula stands near the end of the southern bank of the river; and along the south shore with its many interesting fishermen's villages nestling at the foot of wild hills and mountains.

The book ends with an appreciative chapter on the St. Lawrence in winter. Many photographs which, in themselves, give much information add to the value of the little work. For those who are familiar with the great stream this book will stir up pleasant memories; for such as are interested in history and romance, there is found here a summary of these phases of the river; and for the prospective voyager, the volume will serve as an impetus and a guide to his travels along the pathway of one of the world's noble rivers. R. M. B.

Auf Neuen Wegen Durch Sumatra. Forschungsreisen in Ost- und Zentral-Sumatra (1907). Von Max Moszkowski. xvii and 328 pp., maps, 243 illustrations and index. Dietrich Reimer (Ernst Vohsen), Berlin, 1909. M. 14.

The scene of the author's studies, which were mainly of an ethnological nature, is the sultanate of Siak on the river of that name, and its hinterland on the tributaries of that river. It is located on the east side of Sumatra, between 0° 30′ and 2° N., and 101° 30′ and 103° E. The native tribes whom he met on those rivers represent, as in a museum, the various stages of primitive man in a geographical distribution which makes the author plead very strongly in favor of a climatology, as well as psychology or physiology, of races. The great contrast between the climates of the eastern and western parts of Sumatra is most instructively reflected in its inhabitants. The highland of the west, blessed with an eternal spring, resplendent with light and color, are the home of a, comparatively, highly civilized race, with a gay and artistic temperament; the lowlands of the east, on the other hand, with the damp hothouse atmosphere of their tropical forests, have been unable to produce even the lowest stages of a civilized existence. The soil furnishes its inhabitants their scanty sustenance without any special effort on their part. Any stimulus to make them wish for more is absent, and if they felt it, what would be the use of ploughing and sowing as long as the passing of an elephant herd would suffice to deprive them, in one night, of the results of their labor? Besides, the care for the morrow is eliminated where nobody knows whether there will be a morrow for him or whether the tiger, or a falling tree, or the treacherous climate of the forest, will have disposed of him before the day closes. Thus the tribes of the forest, the Akits, go on living dumb and indifferent, the darkness in their minds being the counterpart to that of their forests whose green shades are never penetrated by the rays of the sun.

They have remained nearer the original condition of primitive man than almost any other savages of whom we know. They have no agriculture, no industry, no art, no inventions of their own. They live in a kind of house boat,

huts built on rafts. In the wilderness, the river is the only open space on which one can build a house or hut without the implements of a higher civilization. Their rafts are either fastened to the shore, or float on the river in true nomadic fashion. In a few places they are also found on land, but then they are raised high on piles—on account of the dampness and danger from sudden floods on the ground—like regular lake dwellings. These tribes live without any state organization and without any form of government.

If these savages may be said to represent the lowest stage in the development of the human race, those on the upper course of the river, the Sakeis, may properly be called the connecting link between them and civilized man. They are not mere "collectors" of food, like the Akits; they have mastered the elements of production. They have a distinct social organization of a matriarchal character. They have not yet established, however, any division of time; they have no calendar, no fixed hours even for sleep and waking, no religious beliefs, no poetry or music. A few superstitious rites are clearly foreign importations, of Malayan origin.

On the Tapung, one of the upper branches of the Siak, the influence of the mountains begins to make itself felt. The valley widens, the inhabitants are an active and industrious race. They are blacksmiths, carpenters, joiners; their tools are adorned with pretty patterns in which Indian influences can be traced; their houses are well built, they cultivate rice and other tropical foodstuffs. Their government is carried on by means of a regular feudal system on a matriarchal basis.

In the mountains, at last, the Rokan states on the river of that name are actual patriarchal despotisms. Their inhabitants live in really comfortable houses, they are skilful farmers, perfect artists in wood-carving, and they have even a script of their own—a fact not even known of the Malays.

In the concluding chapters of the book the author develops, on the basis of his observations, his theories on the origin and development of human habitations, art, religion, music and poetry, thus making the book, indeed, what he promised: a contribution to the history of mankind. Tracing in the forests of Sumatra the development of social institutions, from aggregations of people who merely keep company, to perfect state organizations, he discovers striking analogies with the different stages of development of the white race. The point of importance is, however, that these analogies hold only for part of the process. At a certain point, the possibilities for further development of the colored races seem exhausted, and only the white race continues. Hence he strongly opposes the hypothesis brought forth by so many well-meaning philanthropists, that the colored races differ from the white only in not having reached the goal yet, but that they will reach it sooner or later. If they have not reached the goal by this time, he argues, it means that they will never reach it because they are not able to reach it. He points to the fact that both races started for the goal at the same time, in the same original conditions, and with the same chances for reaching it; but for causes not yet ascertained—maybe climate, or environment, or adaptation and heredity, or natural selections, or whatever influence—the development of the colored races was cut short, and thus the degree of civilization at which we find them now would represent the upper limit of their possibilities. The logical consequence of this argument is, naturally, a warning not to treat the colored races as equals, not even as some-day-equals, of the white, but rather to assign them their place, however humanely, as the inferior and

servant members in the great organism of mankind, and to abstain, of course, from intermarriage altogether in order not to lower the standard of our own civilization in the long run.

The book must be classed with the most noteworthy publications on the subject, and no ethnologist working along these lines ought to leave it unread.

M. K. G.

E. v. Seydlitz's Handbuch der Geographie. Jubiläums-Ausgabe Twenty-fifth Edition of Der grosse Seydlitz," edited by Prof. Dr. E. Oehlmann. xv and 848 pp., 400 figures, maps, and text illustrations. 4 colored maps, 30 colored plates and index. Ferdinand Hirt, Breslau, 1908.

The "Larger Seydlitz" has long ceased to be a mere school book. In the home and office, in the library of the scholar and the teacher, it is equally found as the faithful adviser and reference book which will answer almost any questions of a geographical nature that do not touch the domain of the specialist. This Twenty-fifth "Jubilee" Edition has been, again, not only revised and enlarged, but partly re-written to bring it up to the standard of the latest geographical discoveries and scientific progress. The chapters on Asia, Africa, and the Alps, are practically new contributions, and so is the chapter on Commercial Geography, into which Professor Friedrich of the University of Leipzig has introduced his treatment of the subject by economic zones which are related to, though not identical with, the heat belts, as first described in his well-known textbook of Commercial Geography.

In a book like this, which is intended for more or less practical purposes, the regional treatment of the countries stands, of course, foremost (540 pages out of 805). After that comes Commercial Geography (120 p.) followed by general (150 p.) and mathematical (20 p.) geography. In the treatment of the countries the natural divisions always precede the political ones; clever schemes to facilitate the inevitable memorizing of names and locations are used in many places, although in some instances (see: tributaries of the Mississippi, p. 34) the appeal to visual memory might as easily have a confounding, as a helping, effect. Also the endeavor to say as much as possible in as few words as possible often proves fatal to the smoothness and clearness of the style. Being written for German readers the book is, of course, most thorough in dealing with the countries of Central Europe, but it suffices to read, for instance, the chapters on North America in order to see that in spite of being brief the treatment includes everything essential in the other parts of the world. It is a queer lapse, however, that in a book of German origin, of all the suburbs of New York just Hoboken should have been omitted.

M. K. G.

A History of Sarawak under its Two White Rajahs, 1839–1908. By S. Baring-Gould, M.A., and C. A. Bampfylde, F.R.G.S. xxiii and 464 pp., illustrations and index. Henry Sotheran & Co., London, 1909.

The early histories of nations are the records of the deeds of their great men. As this was true in Greece long ago, so it is true to-day in the awakening of those parts of the earth where the making of nations has as yet hardly begun. Such a history is recorded in this book which tells how the two Brookes, uncle and nephew, gave the now independent state of Sarawak, on the northwest coast of Borneo, "a government for natives second to none;" but it also tells, as has so often been told in English colonial history, a story of the ingratitude of the

mother country toward those who devoted their lives to increase her possessions and her prestige in the far East.

Aside from the wonderful record of colonial achievement, which reads more like an heroic epic than like a chapter of very recent history, the book is full of new data on the ethnology of that great region. The native population, of Indonesian stock, is extremely heterogeneous, but the tribes resemble each other more or less in manners and customs, and the difficulties of classification are further increased by the fact that, in Borneo, a difference in names is not at all an indication of different origin. It seems that all these small tribes are remnants of a once powerful race that were driven from their homes to the jungle, where, under the influence of a more or less nomadic life, they relapsed into savagery. All these tribes are dwindling away, mainly in consequence of in-and-in breeding. The name of Dayaks is applied to two races fundamentally different. The Land-Dayaks are the weakest of the land tribes, abused and trodden on by every tribe on the island until the first white Rajah established law and order. The Sea-Dayaks, on the other hand, are Proto-Malays, that is to say, they belong to the same ethnic family with the Malays but probably descend from an earlier and less mixed type than the Malays of the present. They are dreaded pirates, especially on account of the sacred custom of head hunting. Of all the tasks which the Brookes set for themselves in pacifying the country, the taming of the Sea-Dayaks and the abolition of head hunting was one of the hardest because this barbarous practice had its roots, not in personal animosity against the victim, but in the hallowed belief that to every Sea-Dayak who dies an attendant must be given on his way to the Shades. In the present, the eighty per cent. of this tribe that are subdued have become as reliable and loyal servants of the new order of things as they were of the old.

Another difficult task was the preservation of the Land-Dayaks from entire extinction through the oppression of their stronger neighbors. This was impossible without strenuous measures against piracy and, in the end, a long and fierce war which ended in the defeat of the pirates (and in which the sympathies of the English Parliament were on the side of the defeated). Now, the Land-Dayaks have become prosperous farmers under a government which not only protects them against the loss of their harvests but makes them owners of their lands as long as they continue to cultivate it. Trade, on the other hand, is mostly carried on by the Chinese.

The natives have, through their chiefs, a share in the administration of the government and in its deliberations, and the selection of these chiefs has always been accomplished in accordance with the wishes of the natives. Sympathy between the rulers, who remember that the country originally belonged to the natives, and the people, who know that their present independence and prosperity are due solely to the efforts of their white Rajahs, has been the aim of the whole policy of the latter, and the results have proven the wisdom of this policy. Thus only is it possible that in that state thirty Englishmen can rule safely over 300,000 natives, assisted by a few hundred native policemen, and almost without written laws. No doubt this book "will stand in the future as a record of the work of private individuals who stood alone and unprotected in a foreign land," and, it is to be hoped, will be read with profit by all those who, in any country, go out to develop its foreign possessions and, incidentally, also by those who stay at home and have to decide upon the national policy which may further, or prostrate, their efforts. M. K. G.

Geologische Charakterbilder. Herausgegeben von Dr. H. Stille. Heft. 1. Eisberge und Inlandeis in der Antarktis. Von E. Philippi. Six Plates with descriptive Text. Gebrüder Borntraeger, Berlin, 1910. M. 3.60.

A new publication that promises to be of much value. It is proposed to produce superior pictures from photographs, illustrating the morphology of the earth's surface, the structure of mountains, the development of typical geological formations, etc., with descriptive and explanatory text. The plates in No. 1 (each 8½ x 6 or 6¼ inches, exclusive of margin) embrace the following views of Antarctic ice:

Das Inlandeis westlich vom Gaussberge; Tafelförmiger Eisberg, schwimmend. Posadowsky-Bucht; Senkrechte Wand eines etwa 40 m. hohen Eisberges mit deutlicher Schichtung und Schmelzwasserkanälen, eingefroren im Meereis der Posadowsky-Bucht.; Auf Grund geratener und in der Mitte geborstener tafelförmiger Eisberg, Posadowsky-Bucht.; Gewältzer Eisberg mit gerundeter Aussenseite und tief eingeschmolzenem Schuttbande in der Nähe des Gaussberges.; Schuttführende Wand eines Eisberges mit zahlreichen herausgeschmolzenen Geschieben. Posadowsky-Bucht.

The pictures show, with much clearness, a large amount of detail and each is fully described by Dr. Philippi, professor of geology in the University of Jena and the geologist of the German South Polar expedition on the Gauss, 1901-93. The publishers have in view five subjects for the succeeding numbers of 1910, and in the list of other contributors who have promised illustrated topics is N. H. Darton, the Washington geologist.

An Oriental Land of the Free. Life and Mission Work among the Laos of Siam, Burma, China, and Indo-China. 200 pp., map, illustrations and index. The Westminster Press, Philadelphia, 1910.

A book of ethnological and geographical interest. The author, a missionary of the Presbyterian Board of Foreign Missions at Chieng Mai, Laos, gives a very careful account of this numerous and wide-spread people, who live under the jurisdiction of the four different countries mentioned in the title. The missionary work among them is confined mainly to the large area east of Burma between the Salwin and the Mekong rivers; in other words, to the western half of Laos. Mr. Freeman gives a good description of the land, much detail with regard to the nature and life of the people and about a third of the book to missionary touring and teaching, the native church and the needs and opportunities of the work. While primarily prepared as a text-book for those who are studying Missions systematically, the book is valuable for general readers and libraries. The author says that the Laos people, in their migration from the east, were profoundly affected by only one outside influence, that of Buddhism, which gave them their alphabet, stimulated the growth of a considerable literature, and was great and beneficent in its educational influence.

A Labrador Spring. By Charles W. Townsend, M.D. 262 pp., 57 illustrations from photographs and index. 8vo. Dana Estes & Co., Boston, 1910.

An excellent book, and all the more useful because it relates to the Labrador coast, along the Gulf of St. Lawrence, which is in the Canadian domain and, even yet, is not thoroughly explored. It is only a few years since the Canadians had a clear idea of the tremendous volume of water-power, available for electrical purposes, that is supplied by the numerous rivers which drop

from the Labrador plateau, not far from the Gulf edge, down to the low coastal plain. It is said to surpass the available water-power at Niagara and will some day be utilized.

Dr. Townsend is not only a physician but also an ornithologist and he has a firm grasp on other subjects of natural history. His avocational attainments have enabled him to write a delightful book on the most conspicuous phases of the fauna and flora of this Labrador coast; and human studies also, both Indian and white, came in for a full share of his observations. The production of pulp-wood is now the leading industry, and it is gratifying to hear that the land is not entirely despoiled of its timber, but that forestry methods are employed and the continued growth of the forest seems to be assured. One of the most edifying chapters is that given to the Indians known as the Montagnais or Mountaineers, who live to the south of the Hamilton river while the Nascaupees dwell to the north of it. The Montagnais are nomads who trap for furs, far and wide, during the winter, and come down to the coast, in summer, to sell their products and reburnish their veneer of Christianity, for they are fond of religious feast days and of the ceremonials of the Roman Catholic Church.

It is surprising that so good a book, largely geographical, should be without a map. There is sufficient material for one and a good sketch map of this region, appeared in "La Houille Blanche" by E. Rouillard (*Bull.* Soc. Geog., Quebec, Jan., 1909).

Die Haupttypen des Sprachbaus. Von Dr. Franz Nikolaus Finck. v. and 156 pp. B. G. Teubner, Leipzig, 1910. M. 1.25.

The author, who is a professor in the University of Berlin, takes many characteristic texts from eight chief language types and, by comparison and discussion, gives an insight into the laws governing the formation of human speech. The languages with which he illustrates his subject are the Chinese, Greenlandic (Eskimo), Ssubja (on the upper Zambezi in South Africa), Turkish, Samoan, Arabic, Greek, and Georgian.

Die Sprachstämme des Erdkreises. Von Dr. Franz Nikolaus Finck. viii and 143 pp., and index. B. G. Teubner, Leipzig, 1910. M. 1.25.

Dr. Finck bases, upon the modern results of the study of languages, the comprehensive view which he sets forth in this book of the language groups of the earth, their ramification into single tongues, and the reciprocal coherence of these tongues.

Mensch und Erde. Von A. Kirchhoff. Dritte Auflage. 100 pp. B. G. Teubner, Leipzig, 1910. M. 1.25.

A reprint of this classical little work by the late Prof. Dr. Kirchhoff in which he treats, with consummate skill, of the inter-relations between man and his physical environment. Many notes have been added to the present edition, at the end of the book, giving further facts or comments relating to the text.

Die Grundzüge der Praktische Hydrographie. Von Richard Brauer. Bibliothek der gesamten Technik, 53 Band. 233 pp., 24 tables, 38 illustrations in the text and index. Dr. Max Jänecke, Verlagsbuchhandlung, Hanover, 1907. M. 3.40.

A concise and valuable work on hydrographic phenomena and on the methods, instruments and mathematical formulæ employed in hydrographical research and engineering.

CURRENT GEOGRAPHICAL PAPERS

AMERICA

BRICKWOOD, A. W. Pan-American Railway. *Monthly Cons. and Trade Reports,* No. 357, pp. 38-9, 1910.

DENUCÉ, J. Note sur une grande carte de l'Amérique de l'école des Reinel. *Verhandl.* Intern. Amer. Kongress. Sechzehnte Tagung. Wien, 1908: Erste Hälfte, pp. 19-22. A Hartleben, Vienna and Leipzig, 1910.

NORTH AMERICA

Bahama Islands

NASSAU (Bahama-Inseln). *Annal. der Hydrog. und Mar. Meteor.,* Vol. 38, No. 6, pp. 307-14, 1910.

Cuba

CUBA. Ills. *Bull.* Intern. Union Amer. Reps., pp. 121-132, 1909.

Haiti

HAITI. Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 171-180, 1909.

PRIMBAULT, H. La République d'Haïti. *Bull.* Soc. Royale de Géog. d'Anvers, Vol. 33, No. 4, pp. 711-46, 1910.

Santo Domingo

DOMINICAN REPUBLIC. Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 133-147, 1909.

United States

BAKER, BERNARD N., WM. BULLOCK CLARK AND EDWARD HIRSCH. *Report* of the Conservation Commission of Maryland, for 1908-1909. Ills., maps and index. 202 pp. Baltimore, 1909, [Chapters on mineral resources, agricultural soil resources, forest resources, reclamation of swamps, water resources, fisheries, oyster supply, game preservation, preservation of scenery, public health and good roads.]

BARROWS, H. K., AND R. H. BOLSTER. Potomac River Drainage Basin. *Water-Supply Paper* 241, U. S. Geol. Surv., pp. 328-388, Washington, 1910.

BARROWS, H. K., AND R. H. BOLSTER. Rappahannock River Drainage Basin. *Water-Supply Paper* 241, U. S. Geol. Surv., pp. 339-344, Washington, 1910.

BARROWS, H. K., A. H. HORTON AND R. H. BOLSTER. St. Lawrence River Basin. *Water-Supply Paper* 244, U. S. Geol. Surv., 163 pp., ills. and index, Washington, 1910.

CARMAN, J. ERNEST. The Mississippi Valley between Savanna and Davenport. *Bull.* No. 13, Ill. State Geol. Surv., xi and 96 pp., maps, diagrams, ills. and index, Urbana, 1909.

CLARK, WILLIAM BULLOCK. Maryland Weather Service. Vol. 3. Part 1: Introduction by Forrest Shreve; [climatology, topography, mineralogy, soils and bibliography]; Part 2: The Floristic plant geography of Maryland, by Forrest Shreve; Part 3: The ecological plant geography of Maryland, by Forrest Shreve, M. A. Chrysler and Frederick H. Blodgett; Part 4: The relation of natural vegetation to crop possibilities, by Forrest Shreve; Part 5: The agricultural features of Maryland, by F. H. Blodgett; Part 6: The forests and their products

by F. W. Besley; Part 7: Lists of plants collected or observed, compiled by Forrest Shreve. 533 pp., 39 plates, 12 maps and 3 diagrams. Johns Hopkins Press, Baltimore, 1910. [This fine volume presents a discussion of the plant life of Maryland and allied subjects, the interpretation of which is largely dependent on the physiographic and climatic conditions of the state.]

CLARK, WILLIAM BULLOCK AND OTHERS. Report on the Resurvey of the Maryland-Pennsylvania Boundary, part of the Mason and Dixon Line. Maps and plates. Maryland Geol. Surv., Vol. 7, 412 pp., Johns Hopkins Press, Baltimore, 1908. [Errors in the original survey and the failure properly to mark the boundary line made this resurvey necessary.]

DARTON, N. H. Structural Materials in Parts of Oregon and Washington. *Bull.* 387, U. S. Geol. Surv., 33 pp., map and ills., Washington, 1909.

DAY, DAVID T. The Production of Petroleum in 1908. Advance Chapter from Mineral Resources of the U. S. for 1908, 100 pp., and map, Washington, 1909.

DOLE, R. B., AND H. STABLER. Denudation in the U. S. *Water-Supply Paper* 234, U. S. Geol. Surv., pp. 78-83, Washington, 1909.

FREEMAN, W. B., W. A. LAMB AND R. H. BOLSTER. Arkansas River Drainage Basin. *Water-Supply Paper* 247, U. S. Geol. Surv., pp. 29-84, Washington, 1910.

FREEMAN, W. B., W. A. LAMB AND R. H. BOLSTER. Lower Mississippi Basin, 1907-8. *Water-Supply Paper* 247, U. S. Geol. Surv., 124 pp., ills., Washington, 1910.

FREEMAN, W. B., W. A. LAMB AND R. H. BOLSTER. Red River Drainage Basin. *Water-Supply Paper* 247, U. S. Geol. Surv., pp. 85-107, Washington, 1910.

FREEMAN, W. B., W. A. LAMB AND R. H. BOLSTER. Yazoo River Drainage Basin. *Water-Supply Paper* 247, U. S. Geol. Surv., pp. 109-118, Washington, 1910.

GANNETT, HENRY. Distribution of Rainfall. Map. *Water-Supply Paper* 234, U. S. Geol. Surv., pp. 7-9, Washington, 1909.

HORTON, A. H., E. F. CHANDLER AND R. H. BOLSTER. Upper Mississippi River and Hudson Bay Basins. *Water-Supply Paper* 245, U. S. Geol. Surv., 133 pp, index and ills., Washington, 1910.

HORTON, A. H., M. R. HALL AND R. H. BOLSTER. Tennessee River Basin. *Water-Supply Paper* 243, U. S. Geol. Surv., pp. 106-213, Washington, 1910.

HORTON, A. H., M. R. HALL AND R. H. BOLSTER. Wabash River Drainage Basin. *Water-Supply Paper* 243, U. S. Geol. Surv., pp. 97-105, Washington, 1910.

LEIGHTON, M. O. Developed Water Powers. *Water-Supply Paper* 234, U. S. Geol. Surv., pp. 28-45, Washington, 1909.

LEIGHTON, M. O. Undeveloped Water Powers. *Water-Supply Paper* 234, U. S. Geol. Surv., pp. 46-58, Washington, 1909.

LEIGHTON, M. O. Floods. Diagrams. *Water-Supply Paper* 234, Conserv. Water Resources, pp. 10-27, U. S. Geol. Surv., Washington, 1909.

MCCALLIE, S. W. A Preliminary Report on the Mineral Resources of Georgia. *Bull.* No. 23, Geol. Surv. of Georgia, 208 pp., maps, ills., and index, Atlanta, 1910.

MENDENHALL, W. C. Underground Waters. *Water-Supply Paper* 234, U. S. Geol. Surv., pp. 68-77, Washington, 1909.

NEWELL, F. H. Irrigation. *Water-Supply Paper* 234, pp. 59-67, U. S. Geol. Surv., Washington, 1909.

PARDEE, J. T. Placer Gravels of the Sumpter and Granite Districts, Eastern Oregon. Map. *Bull.* 430-A, Advance Chapter, Contr. Econ. Geol., 1909, pp. 51-62, Washington, 1910.

PARKER, HORATIO N. Control of Catchment Areas. *Water-Supply Paper* 234, U. S. Geol. Surv., p. 94, Washington, 1909.

RANSOME, FREDERICK L. The Geology and Ore Deposits of Goldfield, Nevada. *Prof. Paper* 66, 258 pp., maps, ills. and index, U. S. Geol. Surv., Washington, 1909.

SCHMITTER, FERDINAND. Upper Yukon Native Customs and Folk-Lore. Smithsonian Miscell. Collections, Vol. 56, No. 4, 29 pp., Washington, 1910.

THOMPSON, SLASON. Railway Statistics of the United States of America for 1909. Compared with the Official Reports of 1908 and Recent Statistics of Foreign Railways. 106 pp., Gunthorp-Warren Company, Chicago, 1910.

—— Decisions of the U. S. Geographic Board, July, 1908, to July, 1909. 28 pp., Washington, 1909.

—— Decisions of the U. S. Geographic Board, June 8, 1910.

—— Pensacola. *Annal. der Hydrog. und Mar. Meteor.*, Vol. 38, No. 5, pp. 238-245, 1910.

Canada

SEYFERT, CONSUL A. G. Canadian Agricultural Returns. *Monthly Cons. and Trade Reports*, No. 357, p. 66, 1910.

—— Decisions Geographic Board of Canada, May, 1910, 4 pp., Ottawa, 1910.

—— Decisions, Geographic Board of Canada, 1st Jan., 1910, 8 pp., Ottawa, 1910.

—— Decisions Geographic Board of Canada. March & April, 1910, 5 pp., Ottawa, 1910.

Mexico

ALVAREZ, M. F. La pression du vent dans la ville de Mexico. *Memorias y Revista* Soc. Cient. "Antonio Alzate," Vol. 27, No. 4, pp. 141-153, Mexico, 1908.

MEXICO. Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 192-217, 1909.

SELER, PROF. DR. EDUARD. Die Ruinen von Chich'en Itzá in Yucatan. Ills. *Verhandl.* Intern. Amer. Kong., Sechzehnte Tagung. Wien, 1908: Erste Hälfte, pp. 151-239. A. Hartleben, Vienna and Leipzig, 1910.

CENTRAL AND SOUTH AMERICA

Argentine Republic

—— Argentine Republic. [Annual Review, 1908]. Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 8-30, 1909.

Bolivia

—— Bolivia. [Annual Review, 1908.] Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 31-42, 1909.

Brazil

RICE, HAMILTON. The River Uaupés. Ills. *Geog. Jour.*, Vol. 35, No. 6, pp. 682-700, 1910.

THIÉRY LÉON. Les Vallées du Tocantins et de l'Araguaya. *Le Mouvem. Géog.*, Vol. 27, No. 18, Col. 225 and No. 19, Col. 238, 1910.

WICHMANN, H. Col. Candido Rondons Expedition im brasilischen Hinterlande. Map. *Pet. Mitt.*, Vol. 56, No. 5, pp. 260-61, 1910.

—— Brazil. [Annual Review, 1908.] Ills. *Bull.* Intern. Union. Amer. Reps,. July, pp. 43-71, 1909.

Chile

RISO PATRON, LUIS. La Línea de Frontera con la República Arjentina entre las Latitudes 35°-46° S. Oficina de Límites, 449 pp., and maps, Santiago de Chile, 1907.

—— Chile. [Annual Review, 1908.] Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 72-87, 1909.

—— Primera Memoria del Director de la Oficina de Mensura de Tierras Pasada al Señor Ministro de Colonizacion. 1908. 227 pp., map and ills., Santiago de Chile, 1908.

Colombia

—— Colombia. [Annual Review, 1908.] Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 88-108, 1909.

Costa Rica

—— Costa Rica. [Annual Review, 1908.] *Bull.* Intern. Union Amer. Reps., July, pp. 109-120, 1909.

Dutch Guiana

SCHMELTZ, DR. J. D. E. Die niederländische Tumac Humac-Expedition in Surinam. *Verlandl.* Intern. Amer. Kong., Sechzehnte Tagung. Wien, 1908: Erste Hälfte, pp. 51-54. A. Hartleben, Vienna and Leipzig, 1910.

Guatemala

—— Guatemala. [Annual Review, 1908.] Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 159-170, 1909.

Honduras

—— Honduras. [Annual Review, 1908.] Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 181-91, 1909.

Nicaragua

—— Nicaragua. [Annual Review, 1908.] Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 218-228, 1909.

Panama

—— Panama. [Annual Review, 1908.] *Bull.* Intern. Union Amer. Reps., July, pp. 229-239, 1909.

—— The Natural Resources of Panama. Ills. *Bull.* Intern. Union Amer. Reps., August, pp. 403-411, 1909.

Paraguay

—— Paraguay. [Annual Review, 1908.] Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 240-49, 1909.

Peru

—— Peru. [Annual Review, 1908.] Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 250-63, 1909.

Salvador

—— Salvador. [Annual Review, 1908.] Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 264-272, 1909.

Uruguay

—— Uruguay [Annual Review, 1908.] Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 273-85, 1909.

Venezuela

BENDRAT, T. A. Im Herzen von Venezuela. Studien in der Umgebung von Caicara am Orinoko. Map. *Pet. Mitt.*, Vol. 56, No. 5, pp. 259-60, 1910.

—— Caracas. Municipal Organization. Ills. *Bull.* Intern. Union Amer. Reps., August, pp. 372-384, 1909.

—— Venezuela. [Annual Review, 1908.] Ills. *Bull.* Intern. Union Amer. Reps., July, pp. 286-95, 1909.]

AFRICA

DUGMORE, M. A. RADCLYFFE. Les Fauves d'Afrique photographiés chez eux. Ills. *Le Tour du Monde*, Vol. 16, pp. 205, 217, 229, 241, 253, 265, 1910.

Algeria

DEMONTÈS, VICTOR. La situation générale de l'Algérie. *L'Afrique Franç.*, Vol. 19, No. 5, pp. 159-163, 1910.

—— Chemins de fer algériens. L'Ouenza et les nouveaux tronçons du Réseau. Map. *A Travers le Monde*, Vol. 16, No. 24, pp. 189-90, 1910.

British South Africa

HALL, A. L. The Geology of the Pilgrims Rest Gold Mining District. Transvaal Mines Dep't., Geol. Surv., *Memoir* No. 5, 158 pp., maps, ills. and index, Pretoria, 1910.

HARBORD, F. W. Report on the Manufacture of Iron and Steel in the Transvaal. 18 pp., Transvaal Mines Dep't., Pretoria, 1910.

SUTTON, J. R. Some Observations of Dew at Kimberley. *The Scient. Proc.* Royal Dublin Soc., Vol. 12, No. 34, pp. 266-74, 1910.

British West Africa

—— Annual Reports of the Colony of Southern Nigeria for the Year 1908. 459 pp., Lagos, 1910.

Egypt

CRAIG, J. I. The Populations of Cairo and Alexandria. 7 pp. Reprint from the *Cairo Sci. Jour.*, Vol. 4, No. 43, April, 1910.

French West Africa

GALLOIS EUGÈNE. Note sur la Côte occidentale d'Afrique. *Comptes rendus* Bureau Soc. normande de Géog., Congrès nat. Soc. franç. de Géog., Session XXIV, pp. 282-94, Rouen, 1904.

PASSARGE, S. Henry Huberts Forschungen in Dahomey. *Globus*, Vol. 97, No. 20, pp. 312-17, 1910.

German East Africa

EIFFE, F. F. Die Besiedelungsfrage in Ostafrika. Ills. *Kol. Zeits.*, Vol. 11, No. 10, pp. 211-13 and No. 11, pp 226-29, 1910.

German West Africa

BÜSGEN, M. Beiträge zur Kenntniss der Pflanzenwelt und der Hölzer des Kameruner Waldlandes. Ills. and plate. *Mitt. aus den Deutsch. Schutzgeb.*, Vol. 23, No. 2, pp. 72-98, Berlin, 1910.

KOERT, DR. W. Über Goldvorkommen im östlichen Togo. Map, sketch map

and plans. *Mitt. aus den Deutsch. Schutzgeb.*, Vol. 23, No. 2, pp. 57-67, Berlin, 1910.

—— Ergebnisse der Regenmessungen in Togo im Jahre 1909. *Mitt. aus den Deutsch. Schutzgeb.*, Vol. 23, No. 2, pp. 68-71, Berlin, 1910.

German South Africa

CONNEMANN, CAPT. Hafenanlage in Swakopmund. *Annal. d. Hydrog. und Mar. Meteor.*, Vol. 38, No. 6, pp. 304-6, 1910.

Morocco

FLOTTE DE ROQUEVAIRE, R. DE. Die Kartographie von Marokko. *Pet. Mitt.*, Vol. 56, No. 4, pp. 213-16 and No. 5, pp. 270-72, 1910.

GENTIL, LOUIS. Le Maroc et ses richesses naturelles. Maps and Ills. *La Géog.*, Vol. 21, No. 5, pp. 301-20, 1910.

RENÉ-LECLERC, CH. La Situation économique. Navigation [Morocco]. *L'Afrique Franç.*, Vol. 19, No. 5, pp. 173-77, 1910.

Upper Nile

CHAILLÉ LONG, COL. La Cartographie et l'Histoire de l'Expansion Européenne dans la région du Haut-Nil. *Comptes rendus* Bureau Soc. normande de Géog., Congrès nat. Soc. franç. de Géog., Session XXIV, pp. 361-63, Rouen, 1904.

ASIA

China

LASALLE, C. DE. Chemin de Fer du Yunnan. Map. *Revue Franç. de l'Étrang. et des Col.*, Vol. 35, No. 377, pp. 274-279, 1910.

Chinese Turkestan

STEIN, DR. M. AUREL. Exploration in Central Asia, 1906-8. Ills. *Scott. Geog. Mag.*, Vol. 26, No. 5, pp. 225-240 and No. 6, pp. 281-93, 1910.

Corea

VEBER, K. I. The Corean Language and the Corean Reading of Chinese Hieroglyphs. [In Russian.] Suppl. to Report No. 6, 17 pp., Cartographic Commission, I. R. Geog. Soc., St. Petersburg, 1907.

VEBER, K. I. Tentative Transliteration of the Names of Towns in Corea. Suppl. *Report*, 5 pp., No. 6, Cartographic Commission, I. R. Geog. Soc., St. Petersburg, 1907.

India

FILIPPI, DR. FILIPPO DE. The Expedition of H. R. H. the Duke of the Abruzzi to the Karakoram Himalayas. Ills. *Alpine Jour.*, Vol. 25, No. 188, London, 1910.

LONGSTAFF, T. G. Glacier Exploration in the Eastern Karakoram. Ills. *The Geog. Jour.*, Vol. 35, No. 6, pp. 622-58, 1910.

Japan

ASAKAWA, K. Notes on Village Government in Japan After 1600. *Jour.* Amer. Orient. Soc., Vol. 13, Part 3, pp. 259-300, 1910.

BRINTON, JR., LIEUT. L. C. Japan: The Defense of her Coasts. *Jour.* Mil. Serv. Inst., No. 166, July-Aug., pp. 109-10. Governor's Island, N. Y., 1910 [Translated from *L'Asie française*, April, 1909].

Persia

CAIX, ROBERT DE. La Perse et les Puissances. *L'Asie Franç.*, Vol. 10, No. 109, pp. 179-183, 1910.

Philippines

CORONAS, REV. JOSÉ. Typhoons in the Philippines. Maps and ills. Meteor. *Bull.* for Oct., 1909, Weather Bureau, Manila Central Observ., pp. 336-359, Manila, 1910.

Russian Turkestan

FEDTCHENKO, O. A. AND B. A. Conspectus Floræ Turkestanicæ. Part 2. *Izviestiia* Turkestan Branch I. R. Geog. Soc., 300 pp., Yuriev, 1909.

SCHULTZ, ARVED V. Volks-und wirtschaftliche Studien im Pamir. Ills. *Pet. Mitt.*, Vol. 56, No. 5, pp. 250-254, 1910.

AUSTRALASIA AND OCEANIA

BALL, LIONEL C. The Starcke Goldfield. *Pub.* No. 223, Queensland Geol. Surv., Dept. of Mines, 47 pp., maps and ills., Brisbane, 1909.

BOSSIÉRE, RENÉ E. Les iles Kerguélen. *Bull.* Soc. de Géog. Comm. de Bordeaux, Vol. 36, No. 6, pp. 160-166, 1910.

CAMERON, WALTER E. The Charters Towers Goldfield. Notes on the main Reefs. *Pub.* No. 224, Geol. Surv. of Queensland, Dep't. of Mines, 18 pp., and ills., Brisbane, 1909.

GREGORY, PROF. J.W. The Geographical Factors that Control the development of Australia. *Geog. Jour.*, Vol. 35, No. 6, pp. 658-682, 1910.

HAMILTON, A. The Maori of New Zealand. Ill. *Bull.* Geog. Soc. of Philadelphia, Vol. 8, No. 2, pp. 16-26, 1910.

HAZARD, DANIEL L. Results of Observations Made at the Coast and Geodetic Survey Magnetic Observatory near Honolulu, Hawaii, 1905 and 1906. Coast and Geod. Surv., 112 pp., and ills., Washington, 1910.

LEMIRE, CH. Les Intérêts français aux Nouvelles-Hébrides. *Comptes rendus* Bureau Soc. normande de Géog., Congrès nat. Soc. franç. de Géog., Session XXIV, pp. 293-310, Rouen, 1904.

MORGAN, P. G. The Scenery of New Zealand. Ills. *Bull.* Geog. Soc. of Philadelphia, Vol. 8, No. 2, pp. 1-15, 1910.

SAPPER, DR. KARL. Beiträge zur Kenntnis Neupommerns und des Kaiser-Wilhelms-Landes. Maps. *Pet. Mitt.*, Vol. 56, No. 4, pp. 189-193 and No. 5, pp. 255-56, 1910.

SCHMIDT, P. W. Die soziologischen Verhältnisse der südostaustralischen Stämme. *Globus*, Vol. 97, Nos. 10, pp. 157-160, 11, pp. 173-76, and 12, 186-90, 1910.

WICHMANN, H. Die erste Besteigung des Schneegebirges von Neuguinea. [From Reports of Dr. H. A. Lorentz and Capt. J. W. van Nouhuys.] *Pet. Mitt.*, Vol. 56, No. 5, pp. 258-59, 1910.

—— A Review of Mining Operations in South Australia, Half-Year ended Dec. 31st, 1909. No. 11, 26 pp. and ills., Adelaide, 1910.

—— Papua. Report for the Year ended 30th June, 1909. No. 76, F. 14757, Parliament Commonwealth of Australia, 153 pp., map and ills., 1909.

Siam

—— Siam. General Report on the Operations of the Royal Survey Department, 1906-7. 73 pp., maps and ills., Bangkok, 1909.

EUROPE

PEDDIE, H. J. The Development of the Inland Waterways of Central Europe. *The Scott. Geog. Mag.*, Vol. 26, No. 6, pp. 293-98, 1910.

PORUMBARU, EMMANUEL. La Commission Européenne du Danube. *Compte Rendu* Travaux Neuv. Congrès Intern de Géog., Vol. 1, pp. 446-463, Geneva, 1909.

Balkan States

—— La Population de la Bulgarie par Années. Année 2, No. 7, 15 pp., Sofia, 1910.

France

FRANCONIE, J. Les Voies navigables en France. *Comptes Rendus,* Soc. normande de Géog., Congrès nat. des Soc. franç. de Géog., Session XXIV, pp. 126-46, Rouen, 1904.

GUÉNOT. La dévastation des forêts dans les Pyrénées. *Comptes rendus* Bureau Soc. normande de Géog., Congrès nat. Soc. franç. de Géog., Session XXIV, pp. 167-179, Rouen, 1904.

GUÉNOT. La Navigation de la Garonne dans les temps anciens. *Comptes rendus* Bureau Soc. normande de Géog., Congrès nat. Soc. franç. de Géog., XXIV Session, pp. 209-221, Rouen, 1904.

LEMOINE, PAUL. Les principaux travaux sur la Géologie des Colonies françaises en 1908. Contrib. Connaissance Géol. des Col. franc., VII, 28 pp., Paris, 1909.

LE PARQUIER. De l'invasion de la mer sur les côtes du Cotentin. Map. *Comptes rendus* Bureau Soc. normande de Géog., Congrès nat. Soc. franç. de Géog., Session XXIV, pp. 270-82, Rouen, 1904.

RABOT, CHARLES. La surface forestière de la France. *La Géog.*, Vol. 21, No. 5, 325, 1910.

—— Service d'Études des Grandes Forces Hydrauliques (Région des Alpes). *Annales,* Direction de l'Hydraulique, No. 32, 2 Vols. Vol. 1, 177 pp., maps and ills., Vol. 2, 451 pp., maps and diagrams, Paris, 1905.

—— Service d'Études des Grandes Forces Hydrauliques (Région des Alpes). *Compte-Rendu* et Résultats des Études & Travaux, 1907. Direction de l'Hydraulique et des Améliorations agricoles, Vol. 3, 688 pp., maps, diagrams and ills., 1908.

Germany

BLONDEL, GEORGES. Le Développement de la Navigation maritime et fluviale en Allemagne. *Comptes rendus* Bureau Soc. normande de Géog., Congrès nat. Soc. franç. de Géog., Session XXIV, pp. 364-74, Rouen, 1904.

GRADMANN, DR. ROBERT. Die ländlichen Siedlungsformen Württembergs. Maps. *Pet. Mitt.*, Vol. 56, No. 4, pp. 183-186, and No. 5, pp. 246-249, 1910.

—— Die geologische Karte von Preussen und benachbarten Bundesstaaten im Masstabe 1:25,000. Sketch Map. *Pet. Mitt.*, Vol. 56, No. 5, pp. 269-70, 1910.

—— Jahrbuch für Bremische Statistik. Zur Statistik des Schiffs-und Warenverkehrs im Jahre 1909. 371 pp., Bremischen Statistischen Amt, Bremen, 1910.

—— Statistischer Bericht über den Betrieb der Königlich Bayerischen Posten und Telegraphen im Verwaltungsjahr 1908. 281 pp., Munich.

Netherlands

DUBOIS, EUG. Over Duinvalleien, den Vorm der Nederlandsche Kustlijn en Het Ontstaan van Laagveen in Verband met Bodembewegingen. *Tijdsch.* Kon. Nederl. Aardrijsk. Genoots., Vol. 27, No. 3, pp. 395-402, 1910.

HORN, A. V. Einfluss des neuen Wasserweges nach Rotterdam auf die Gezeitenlinie. Diagrams. *Annal. der Hydrog. und Mar. Meteor.*, Vol. 38, No. 6, pp. 271-74, 1910.

Switzerland

GOEGG, E. Le Tunnel du Simplon et les Voies d'accès italiennes. *Comptes rendus* Bureau Soc. Normande de Géog., Congrès nat. Soc. franç. de Géog., Session XXIV, pp. 181-197, Rouen, 1904.

HOTZ-LINDER, DR. RUD. Schweizer Schulkartographie. *Georg. Anzeig.*, Vol. 11, No. 3, pp. 56-59 and No. 4, pp. 82-85, Gotha, 1910.

ROBSON, J. WALTER. Alpine Peaks and Valleys. Ills. *Jour.* Manchester Geog. Soc., Vol. 25, Part 2, pp. 49-66, 1909.

SALOMON, WILHELM. Die Adamellogruppe, ein alpines Zentralmassiv, und seine Bedeutung für die Gebirgsbildung und unsere Kenntnis von dem Mecanismus der Intrusionen. Part 1. k. k. Geol. Reichsanstalt, 433 pp., and maps, Vienna, 1908.

United Kingdom

COLLET, DR. LÉON. W. Le Service des Lacs d'Ecosse, son But, ses Résultats hydrographiques et géologiques. *Compte Rendu,* Travaux Neuv. Congrès Intern. de Géog., Vol. 1, pp. 428-437, 1909.

COSSAR, J. The Distribution of the Towns and Villages of Scotland. *Scott. Geog. Mag.*, Vol. 26, No. 4, pp. 183-191, and No. 6, pp. 298-319, 1910.

CUNNINGHAM, W. The Cambridgeshire Rivers. Sketch Maps. *Geog. Jour.*, Vol. 35, No. 6, pp. 700-5, 1910.

Polar

ARCTOWSKI, HENRYK. Le Problème de l'Antarctide et les Problèmes de l'Antarctique. (Résumé.) *Compte Rendu* Travaux Neuv. Congrès Intern. de Géog., Vol. 1, pp. 383-385, Geneva, 1909.

PILLSBURY, ADMIRAL J. E. Wilkes' and d'Urville's Discoveries in Wilkes Land. *Proc.* U. S. Naval Institute, Vol. 36, No. 2, Whole No. 134, pp. 465-68, 1910.

STEIN, DR. R. Kapitän Berniers neue Polar-expedition. *Pet. Mitt.*, Vol. 56, No. 5, p. 261, 1910.

CARTOGRAPHY

PENCK, PROF. DR. ALBRECHT. Bericht des Komités der Erdkarte im Masstabe 1:1,000,000. *Compte Rendu* Travaux Neuv. Congrès Intern. de Géog., Vol. 1, pp. 397-400, Geneva, 1909.

SCHRADER, FR. Sur l'Association cartographique Internationale et sur un Moyen d'en faciliter la Création. *Compte Rendu* Travaux Neuv. Congrès Intern. de Géog., Vol. 1, pp. 388-396, Geneva, 1909.

TRONNIER, RICH. Über Eisenbahnferne und Eisenbahnfernekarten. Map. *Pet. Mitt.*, Vol. 56, No. 5, pp. 257-8, 1910.

ECONOMIC GEOGRAPHY

BLONDEL, GEORGES. Les Ports Francs. *Compte Rendu* Travaux Neuv. Congrès Intern. de Géog., Vol. 1, pp. 438-445, Geneva, 1909.

GOLF, DR. A. Die Viehzucht in den deutschen Kolonien und ihre Beziehung zur heimischen Volkswirtschaft und Landwirtschaft. Ills. *Deutsche Kolonialz.*, Vol. 27, No. 22, pp. 358-360, 1910.

LEVASSEUR, E. Le Prix du Blé dans Divers Pays au XIXe Siècle. *Bull.* Institut Intern. de Stat., Vol. 18, Part 2, 111-118, Nancy, 1909.

MASSÉ, DR. JEAN BIALET. Rapport sur la Création de Colonies Cotonnières Nationales. *Annal.* du Minist. de l'Agric., Vol. 1, No. 1, 300 pp., maps and ills., Buenos Aires, 1906.

PIQUET, E. Études sur les Ports et Zones franches. *Comptes rendus* Bureau Soc. normande de Géog., Congrès nat. Soc. franç. de Géog., Session XXIV, pp. 249-260, Rouen, 1904.

SCHLOTTMANN, K. Die Stellung des deutschen Aussenhandels im Welthandel 1907. *Geog. Anzeig.*, Vol. 11, No. 4, pp. 79-82, Gotha, 1910.

SUPF, KARL. Deutsch-koloniale Baumwoll-Unternehmungen. Maps. *Beihefte zum Tropenpfl.*, Vol. 11, No. 3, pp. 130-250, 1910.

—— Baumwollorganisation. Ills. *Kol. Zeits.*, Vol. 11, No. 15, pp. 292-95, 1910.

—— Mahogany. Ills. *Bull.* Intern. Union Amer. Reps. August, pp. 386-402, 1909.

—— Rapports présentés au Premier Congrès International des Industries Frigorifiques de Paris par le Comité National Argentin. Ills. *Bull.* Min. de l'Agric., 211 pp., Buenos Aires, 1908.

PHYSICAL GEOGRAPHY

BAUER, L. A., AND W. J. PETERS. The Complete Magnetic Results of the First Cruise of the "Carnegie," 1909-10. Ills. *Terr. Mag. and Atmos. Elect.*, Vol. 15, No. 2, pp. 57-82, Baltimore, 1910.

DELLIT, DR. O. Die Pendulationstheorie. 5 maps. *Geog. Anzeig.*, Vol. 11, No. 3, pp. 49-52 and No. 4, pp. 76-79, Gotha, 1910.

GIBSON, HERBERT. The Genesis and Function of the Dew-Pond. *Symons's Meteor. Mag.*, Vol. 45, No. 532, pp. 63-67, 1910.

HUMPHREYS, W. J. Vertical Temperature Gradients as Modified by Seasons and by Storm Conditions. Diagrams. *Bull.* Mount Weather Observatory, Vol. 2, Part 4, pp. 183-92, Washington, 1910.

KIDSON, E. Atmospheric Electricity Observations on the first Cruise of the "Carnegie," 1909-10. Diagrams. *Terr. Mag. and Atmos. Elect.*, Vol. 15, No. 2, pp. 83-91, Baltimore, 1910.

KNOPF, ADOLPH. The Probable Tertiary Land Connection between Asia and North America. *Bull.* Dep. of Geology, Univ. of Cal. *Pub.*, Vol. 5, No. 28, pp. 413-420, Berkeley, Cal., 1910.

LALLEMAND, CH. La Respiration de la Terre. L'Ecorce terrestre, ses Mouvements et ses lentes Déformations. Ills. *Compte Rendu* Travaux Neuv. Congrès Intern. de Géog., Vol. 1, pp. 401-427, Geneva, 1909.

LUTGENS, DR. RUDOLF. Weitere Untersuchungen über die Verdunstung auf dem Meere. *Annal. d. Hydrog. und Mar. Meteor.*, Vol. 38, No. 6, pp. 267-71, 1910.

NÖLKE, DR. FR. Über die Pendulationstheorie. *Geog. Anzeig.*, Vol. 11, No. 5, pp. 100-102, Gotha, 1910.

TITTMANN, O. H. Principal Magnetic Storms Recorded at the Cheltenham Observatory, Jan.-March, 1910. *Terr. Mag. and Atmos. Elect.*, Vol. 15, No. 2, p. 106, Baltimore, 1910.

WOODWARD, R S. The Atmosphere. *Bull.* Mount Weather Observ., Vol. 2, Part 5, pp. 298-308, Washington, 1910.

NEW MAPS

NORTH AMERICA

U. S. GEOLOGICAL SURVEY MAPS

CALIFORNIA. Map of California showing Drainage Areas and Locations of Sampling Stations. 1:2,500,000=39.4 miles to an inch. 15¼ x 18 inches. Pl. 1, *Water Supp. Pap.* 237: "The Quality of the Surface Waters of California," by Walton Van Winkle and Fred. M. Eaton. 1910. [Shows, in red, divisions of drainage areas and position of sampling stations.]

SOUTH DAKOTA AND WYOMING. (a) Map showing Distribution of Underground Water in the Dakota and underlying Sandstones in the northern half of the Black Hills region in South Dakota and Wyoming. 1 inch=4 miles. 44°-45° N.; 103°-105° W. 25¼ x 17¼ inches. Contour interval, 100 ft. By N. H. Darton. [Colored symbols to show outcrop areas of sandstones, approximate areas in which artesian flows may be expected, depths of Dakota and Minnelusa sandstones and location, with depths, of artesian wells and unsuccessful deep borings]; (b) Geologic Map of the northern half of the Black Hills region in South Dakota and Wyoming. Scale, coordinates, size and interval as on map a. By N. H. Darton. [Nineteen colored symbols for geological formations. Both maps illustrate Prof. Paper 65: "Geology and Water Resources of the northern Portion of the Black Hills and adjoining Regions in South Dakota" by N. H. Darton, 1908.]

WYOMING. (a) Map of Powder R. Coal Field, adjacent to the Burlington R.R. 1 inch=4 miles. 12¼ x 13½ inches. Inset showing coal sections; (b) Map of Buffalo Coal Field, showing sections of coal beds. 1 inch=4 miles. 10⅜ x 11 inches; (c) Map of T. 43 N., R. 79 W. 1 inch=4 miles. 8½ x 6½ inches. Contour interval, 100 ft. [Indications of coal outcrops and coal 500 and 1,000 feet deep]; (d) Map of Coal Field in S. E. part of the Bighorn Basin. 1 inch=4 miles. 9⅜ x 9⅝ inches. [Shows distribution of coal, shale, bone and sandstone]; (e) Map of eastern part of Litte Snake R. Coal Field. 1 inch=4 miles. 10⅞ x 10⅞ inches; (f) Map of southern part of Rock Spring Coal Field. 1 inch=4 miles. 16⅛ x 12⅛ inches; (g) Map of Rockfield Coal Zone in S. part of Rock Springs coal field, Sweetwater Co. 1 inch=1 mile. 12¼ x 29 inches. [All black and white maps in *Bull.* 381-B "Investigations of the Coal Fields in Wyoming by the U. S. Geol. Surv. in 1908" by R. W. Stone, and others.]

U. S. COAST AND GEODETIC SURVEY MAPS

UNITED STATES. Level Net of 1907. 1 inch=140 miles. [Illustrates "Pre-

cise Leveling in the U. S., 1903-1907, with a Readjustment of the Level Net and resulting Elevations," by John F. Hayford and L. Pike. 1909.]

U. S. HYDROGRAPHIC OFFICE CHARTS

Pilot Chart of the North Atlantic Ocean, Sept., Oct., Nov., 1910.
Pilot Chart of the North Pacific Ocean, September, 1910.

U. S. WEATHER BUREAU CHARTS

Meteorological Charts of the North Atlantic Ocean, September, 1910. [With description and charts, on the reverse, of the West Indies Hurricane, Sept. 16-21, 1909.]

Meteorological Chart of the South Atlantic Ocean, Sept., Oct., Nov., 1910.
Meteorological Chart of the North Pacific Ocean, September, 1910.
Meteorological Chart of the South Pacific Ocean, Sept., Oct., Nov., 1910.

U. S. DEPARTMENT OF AGRICULTURE MAPS

UNITED STATES. Soil Survey Maps of Hale Co., Ala; Caribou Area, Maine; Scranton Area, Miss.; Bates Co., Mo. 1 inch=1 mile. [In colors, with contours of elevation and descriptive text.]

WEST VIRGINIA. Three maps of Wood, Ritchie and Pleasants Counties: (a) Topography; (b) General and Economic Geology; (c) Agricultural Soils. 1:62,500=0.9 miles to an inch. 39° 5′-39° 25′ N.; 80° 50′-81° 45′ W. 25¼ x 48½ inches. West Virginia Geological Survey, Morgantown, 1909. [Colored maps, based on U. S. Geological Survey sheets. On c, the results of the soils survey, carried out by the State Geological Survey in co-operation with the Bureau of Soils, U. S. Dep't. of Agriculture, are imposed upon the U. S. topographic sheets.]

WEST VIRGINIA. Map of West Virginia showing coal, oil, gas and limestone areas. 1 inch=7 miles. 18 x 43 inches. Revised Edition. West Virginia Geol. Surv., Morgantown, 1910. 50c. [The first edition, published in 1908, was noticed in the *Bulletin*, Vol. 42, p. 396.]

SOUTH AMERICA

ARGENTINA. Mapa de la Vertiente Oriental de la Cordillera entre 39° y 41° Lat. Sud. 1 inch=18 miles. 22¾ x 17 inches. Illustrates paper "Estudios Geográficos de la Vertiente Oriental de la Cordillera Argentina" by Dr. Franz Kühn. *Bol.* del Inst. Geog. Argentino, Vol. 123, Nos. 1-12, Buenos Aires, 1909. [The region mapped lies wholly in the Territory of Neuquen. Symbols are used for predominant land forms, and phases of vegetation.]

ARGENTINA. Übersichtskarte der argentinischen Cordillere zwischen 39° und 41° südlicher Breite. 1:1,000,000=15.78 miles to an inch. 13½ x 16½ inches. Inset: Die interozeanische Wasserscheide in der Vega de Maipu. Scale about 6 times that of main map. *Zeits.* der Gesells. für Erdk. zu Berlin, No. 6, Berlin, 1910. [Illustrates paper: "Geographische Studien über Nordwest-Patagonien," by Dr. Franz Kühn. Topography and flora shown by brown and black symbols.]

ARGENTINA (a) Copie du Cours du Pilcomayo prise sur la Photographie d'une ancienne Carte (auteur inconnu). Document inédit par E. A. Thouar. 7 x 9½ inches; (b) Cours du Pilcomayo. Par E. A. Thouar, 1909. 12½ x 9½

inches. [After Thouar's surveys and the work of other explorers]; (c) Cours du Pilcomayo. Par E. A. Thouar, 1900. Document inédit No. 3. 13 x 9 inches; (d) La Region de los Esteros entre el Pilcomayo superior é inferior segùn los Datos del Ingeniero Gunardo Lange completados por las Expediciones de Adalberto y Arnaldo Schmied en 1906 y 1907. 21 x 12¼ inches. [Symbols for routes, mountains, etc.]; (e) Región de los Esteros del Rio Pilcomayo y Rio Confuso con sus Alrededores explorada por Adalberto y Arnaldo Schmied en 1906 y 1907. 1:600,000=9.4 miles to an inch. 22½ by 12 inches. (f) Plano topografico del Rio Pilcomayo levantado por la Comision mixta Argentino-Paraguaya, 1906-1908. 1:482,700=7.6 miles to an inch. [This is the most detailed and accurate map of the lower Pilcomayo to the region, between 59° 20′-59° 40′ W. Long., where the river is lost in the Estero Patiño (swamps). The place where the upper river enters this swamp region is indicated. These maps illustrate a series of papers by Thouar, Adalberto Schmied and D. Krausse on the successive efforts to solve the mystery of the Pilcomayo, in the *Boletin* del Instituto Geográfico Argentino, Vol. 23, Nos. 1 á 12, Buenos Aires, 1909.]

ARGENTINA-CHILE. Skizze der Bahnstrecke Valparaiso-Mendoza. 1:750,000=11.84 miles to an inch. 5 x 18 inches. *Geogr. Anzeiger,* Vol. 11, No. 5, Gotha, 1910. [Shows the route of the recently completed trans-continental railroad across the Andes, indicates the narrow gauge, cogged part of the line between Mendoza and Santa Rosa de los Andes and is accompanied by a profile of the line between the Atlantic and Pacific, with 10-fold exaggeration of the vertical scale.]

CHILE-ARGENTINA. Maps del Camino Trasandino sobre el Bouquete de Pérez Rosales. 17½ x 12¾ inches. Also profile of route between Bariloche on L. Nahuel Huapí, and Puerto Montt on the Pacific, across the Andes, with ten-fold exaggeration of the vertical scale. Illustrates paper "El Camino Trasandino sobre el Boquete de Pérez Rosales" by Dr. Franz Kühn, in Bol. del Instituto Geográfico Argentino, Vol. 23, Nos. 1-12, Buenos Aires, 1909. [Six tints and white for altitudes. Fully two-thirds of the route is by water across lakes Llanquihue, Todos los Santos and Nahuel Huapí.]

AFRICA

BELGIAN-CONGO. Carte politique du Congo Belge. 1:8,000,000=126.2 miles to an inch. 11 x 11 inches. *Le Mouvem. Géogr.,* Vol. 27, No. 21, 1910. [Shows, in colors, the twelve Districts of the Colony.]

BELGIAN CONGO-UGANDA. Le Bassin du lac Albert. 1:2,000,000=31.56 miles to an inch. 29° 10′-32° E. of Paris; 0° 30′-3° N. 5 x 5½ inches. *Le Mouvem. Géogr.,* No. 23, 1910. [Black map with paper: "Le Lac Albert."]

CAMEROONS. Karte des Konzessionsgebietes der Gesellschaft Süd-Kamerun. 1:300,000=4.73 miles to an inch. By W. Moisel. 1° 58′-3° 43′ N.; 13° 27′-15° 19′ E. 26½ x 42 inches. *Mitt. aus den Deuts. Schutzgeb.,* Vol. 23, No. 2, Berlin, 1910. [Shows commercial stations, highways, native paths, forest boundaries, etc. Large parts of the concession are uninhabited and little explored forest areas. Mr. Moisel has supplied a description of the map.]

GERMAN EAST AFRICA. Dialect Karte von Unjamwesi. Nach Mitteilungen von Missionssuperintendent R. Stern und andern Quellen bearbeitet von Bernhard Struck. 1:2,000,000=31.56 miles to an inch. 2° 15′-8° 30′ S; 29° 30′-35° E.

14 x 12 inches. *Mitt aus den Deuts. Schutzgeb.*, Vol. 23, No. 2, Berlin, 1910. [In colors, with explanatory text by Mr. Struck.]

NORTHEAST AFRICA. Carte politique de la Vallée du Nil en 1894. 1:12,000,000=189.39 miles to an inch; 0°-31° N.; 19°-45° E. 11¼ x 9 inches *Le Mouvem. Géogr.* Vol. 27, No. 20, 1910. [In colors. Shows the itineraries of Kitchener, the Marchand mission, Dhanis and other Belgian officers and illustrates an article: "Souvenirs de Fashoda et de l'Expédition Dhanis."]

SOUTHWEST AFRICA. South West Africa. By Prof. H. H. W. Pearson. 1:2,500,000=39.46 miles to an inch. 26° 25′-34° 50′ S.; 13° 35′-21° 10′ E. 14⅞ x 12¼ inches. Inserts of South Africa in 1:40,000,000 and Southern Angola in scale of main map. *Geogr. Journ.* May, 1910. [Names in red across the author's route show approximately the distribution of vegetation. Illustrates paper: "The Travels of a Botanist in S. W. Africa" by Prof. Pearson.]

TOGO. Marsch des Dr. Koert längs des Mónu vom Wegübergang Agbandi-Bagu an bis nach Ssadá und die unterwegs festgestellten Goldvorkommen. 1:100,000=1.5 mile to an inch. 18 x 3½ inches. *Mitt. aus den Deuts. Schutzgeb.*, Vol. 23, No. 2, Berlin, 1910. [Gold finds are indicated on this black map, with many notes on the geology. Illustrates paper: "Über Goldvorkommen im östlichen Togo."]

ASIA

TIBET. Das Hochland von Tibet zur Übersicht von Sven Hedins Reisen 1894-1908. 1:3,700,000=58.3 miles to an inch. 26° 10′-40° 30′ N.; 76° 48′-97° 40′ E. Entwurf und Terrain von H. Habenicht. Situation und Schrift von C. Barich. Inset of South England on same scale as main map. *Pet. Mitt.* Vol. 56, 2 Halbband, Heft 1, 1910. [This fine map was prepared to accompany Dr. Hedin's paper in the same number: "Die wissenschaftlichen Ergebnisse meiner Reise in Tibet, 1906-08." Dr. Hedin says in this paper: "With regard to geographical discoveries, naturally everything is new as soon as the explorer enters one of the 'white' areas. A good idea of the progress of discovery in Tibet may be gained by comparing sheet 62 in Stieler's Hand Atlas (1909) with the superior and beautiful map by Habenicht and Barich in the present number of *Petermanns Mitteilungen*. This map is, in all respects, up to date and gives, not only an excellent picture of a complicated and strongly accentuated part of the earth's surface that is very difficult to describe, but also shows very clearly what has already been done and what remains to be accomplished. The map is likely, for some time, to supersede all other maps of Tibet because it gives all the latest discoveries and it has been carried out with the greatest care and skill. It adds to our earlier data great wealth of information with regard to the distribution, size and shape of the myriad lakes of western and central Tibet. We see here the long range discovered by Ryder designated as the "Ryder-Kette," as Habenicht had suggested. The map is especially rich in the large number of determinations of heights of mountains, passes, lakes and places, a particularly prominent feature of the great work which Dr. Hedin has carried out. The mountains extending from south of Tengri-nor to and beyond the western border of Tibet, whose exploration was very far advanced by Sven Hedin, and which were named by him, Trans Himalaya, are so designated on this map, in brackets, but it seems likely that this name will be replaced by Hedin Mountains which are so indicated on this map to the west of 84° E. Long. This new map of Tibet is one of the most notable contributions to cartography of recent years.]

EUROPE

AUSTRIA-HUNGARY. Schulwandkarte des Politischen Bezirkes Horn. 1:40,000=0.6 mile to an inch. 4 sheets. 48° 30′-48° 56′ N.; 15° 22′-15° 59′ E. Herausgegeben vom k. k. Bezirksschulrate Horn. G. Freitag & Berndt, Vienna, 1909. [Eighteen black symbols and six tints are used. Contours of elevation with 20 meters interval.]

GERMANY. (a) Geologische Karte der Umgebung von Letmathe, [Westphalia]. 1:25,000=0.39 mile to an inch. 6½ x 4⅞ inches. 30 colored symbols for formations. [Illustrates: "Über eine Exkursion in das Devon u. Culmgebiet nördlich von Lethmathe," von A. Denckmann; (b) Quellmore in Masuren, [East Prussia]. 1:125,000=1.9 mile to an inch. 8⅝ x 5¼ inches. Colors. [Illustrates paper (same title) by H. Hess v. Wichdorff and P. Range]; (c) Geologische Karte des Grossen Moosbruches in Ostpreussen, bearbeitet von A. Klautzsch, 1903-05. 1:50,000=0.7 miles to an inch. 12 x 10 inches. Colors; (d) Höhenschichten Karte des Grossen Moosbruches in Ostpreussen, by A. Klautzsch. 1:50,000. 12 x 10 inches. Contours in colors with 5 meters interval. [c and d illustrate "Die geologischen Verhältnisse des Grossen Moosbruches in Ostpreussen unter Berücksichtigung der jetzigen Pflanzenbestände," by A. Klautzsch]; (e) Geologische Übersichtskarte des Hümmlings (Hannover). 1:250,000=3.95 miles to an inch. 52° 36′-53° N.; 24° 50′-25° 50′ E. 10¾ x 7¼ inches. Colors. [With paper: "Geologische Beobachtungen im Hümmling," by F. Schucht]; (f) Geologische Spezialkarte der Gegend von Ütersen u. Schulau [Schleswig-Holstein]. Nach den Spezialaufnahmen von H. Schröder u. J. Stoller. 1:25,000=0.39 mile to an inch. 14½ x 24 inches. [This map in colors illustrates paper: "Diluviale marine u. Süsswasser- Schichten bei Ütersen-Schulau," by H. Schröder and J. Stoller. *Jahrbuch* der Königil. Preussischen geologischen Landesanstalt u. Bergakademie zu Berlin, für 1906, Berlin, 1909.]

SILESIA. Schulwandkarte des Herzogtums Schlesien. 1:100,000=1.5 mile to an inch. 4 sheets. 49° 27′-50° 30′ N.; 15° 52′-19° 12′ E. Bearbeitet von Rudolf Kober, k. k. Bezirksschulinspektor. G. Freytag & Berndt, Vienna, 1909.

OCEANIA

PACIFIC OCEAN. (a) Lotungen S. M. S. "Planet," 1909. 11° 30′-21° 10′ S.; 164°-172° 40′ E. 7½ x 9 inches. (b) Lotungen S. M. S. "Planet," Juni-Okt., 1909. 4°-8° S.; 148°-155° E. 8½ x 15½ inches. *Ann. der Hydr. und Marit. Met.*, Heft 3, 1910. [Black maps with soundings and contours of depths in meters. Map a shows, mainly, work done among and near the New Hebrides; map b, soundings from New Pomerania to the northern part of the Solomon group. The soundings on both maps are supplemented by the figures of earlier data. The maps illustrated paper: "Tiefseelotungen S. M. S. Planet, 1909 unter dem Kommando von Korvetten-kapitän v. Trotha."]

POLAR

ARCTIC. The State of the Ice in the Arctic Seas, 1909. 7½ x 10½ inches. Danish Meteorological Institute, Copenhagen, 1910. [Three maps showing the ice conditions in June, July and August, 1909. Colored symbols for unbroken polar ice-fields, land-floes, etc., with white indicating ice supposed but no information. Letterpress in Danish and English.]

OTHER ACCESSIONS

NORTH AMERICA

ANDERSON, ALEX. D. The Silver Country, or, the Great Southwest, etc. [Map.] New York, G. P. Putnam's Sons. 1877. 12mo.

ANDERSON, DAVID. Canada: or, a View of the Importance of the British American Colonies; etc., etc. [Map.] London, J. M. Richardson. 1814. 8vo.

BAXTER, JAMES PHINNEY. A Memoir of Jacques Cartier, Sieur de Limoilou. His Voyages to the St. Lawrence, etc. (Charts, etc.) New York, Dodd, Mead & Co. 1906. 8vo.

ELLIOTT, CHARLES W. The New England History, from the Discovery of the Continent by the Northmen, A. D. 986, to the Period when the Colonies declared their Independence, A. D. 1776. 2 vols. [2 illustrations.] New York, Charles Scribner. 1857. 8vo.

FORTIER, ALCÉE. A History of Louisiana. 4 vols. (Maps, etc.) New York, Manzi, Joyant & Co., Successors to Goupil & Co., of Paris. 1904. 8vo.

GARRISON, GEORGE PIERCE. Westward Extension, 1841-1850. *The American Nation: A History. Vol 17. Edited by A. B. Hart.* Maps [& Frontispiece]. New York, Harper & Bros. 1906. 8vo.

RUSSELL, W. HOWARD. Canada; Its Defences, Condition and Resources, etc. [2 Maps.] London, Bradbury & Evans. 1865. 8vo.

SMITH, SAMUEL. The History of the Colony of Nova-Cæsaria, or New Jersey, etc., etc. (2nd Edition.) [Map.] Burlington, in New Jersey. James Parker. 1765. 8vo.

STONE, WILLIAM L. Life of Joseph Brant (Thayendanegea), including the Border Wars of the American Revolution, etc., etc. 2 vols. [Illustrated.] Albany, J. Munsell. 1864, 8vo. *Gift.*

AFRICA

ANVILLE, (J. B. BOURGUIGNON) D'. Mémoires sur l'Egypte ancienne et moderne, suivis d'une Description du Golfe Arabique ou de la Mer Rouge. [Cartes.] A Paris, de l'Imprimerie Royale. 1766. 4to.

BARNARD, ANNE. South Africa a Century Ago. Letters written from the Cape of Good Hope (1797-1801). By the Lady ——. Edited with a Memoir . . . by W. H. Wilkins. Portrait. London, Smith, Elder & Co. 1901. 8vo.

BENSON, MARGARET, and GOURLAY, JANET. The Temple of Mut in Asher. An Account of the Excavation of the Temple . . . and the Main Religious Ideas of the Egyptians. The Inscriptions and Translations by Percy E. Newberry. Plans, etc. London, John Murray. 1899. 8vo.

BUCHANAN, JOHN. The Shirè Highlands (East Central Africa). As Colony and Mission. [Map & Plan.] Edinburgh, William Blackwood & Sons. 1885. 8vo.

BUDGE, E. A. WALLIS. The Dwellers on the Nile, or Chapters on the Life . . . of the Ancient Egyptians. 2nd Edition. (Illustrations.) *By-Paths of Bible Knowledge, VIII.* [London] Religious Tract Society. 1888. 8vo.

COILLARD, FRANÇOIS. Sur le Haut-Zambèze. Voyages et Travaux de Mission. Préface de M. J. De Seynes. Cartes, etc. Paris, Berger-Levrault et Cie. 1899. 8vo.

FITZGERALD, WILLIAM WALTER AUGUSTUS. Travels in the Coastlands of

British East Africa and the Islands of Zanzibar and Pemba, etc. Maps, etc. London, Chapman & Hall. 1898. 8vo.

[KELTIE, J. S.] Great Explorers of Africa. Map, etc. 2 vols. London, Sampson Low, Marston & Co. 1894. 8vo.

REINDORF, CARL CHRISTIAN. History of the Gold Coast and Asante, etc. [Illustrated.] Basel, Printed for the Author. 1895. 8vo.

REPIQUET, JULES. Le Sultanat d'Anjouan (Iles Comores) Photographies. Paris, Augustin Challamel. 1901. 8vo. pr.

RYAN, VINCENT W. Mauritius and Madagascar: Journals of an Eight Years' Residence in . . Mauritius, etc. (Map, etc.) London, Seeley, Jackson & Halliday. 1864. 8vo.

STUTFIELD, HUGH E. M. El Maghrek: 1,200 Miles' Ride Through Marocco. [Map.] London, Sampson Low, Marston, etc. 1886. 8vo.

VOLNEY, C. F. Travels through Egypt and Syria, in the Years 1783, 1784 & 1785. Containing the present Natural and Political State of those Countries; etc. Translated from the French. [Frontispiece.] 2 vols. New York, J. Tiebout, Prt., 1798. Sm. 4to.

ASIA

SEAMAN, LOUIS LIVINGSTON. The Real Triumph of Japan, etc. (Illustrations.) New York, D. Appleton & Co. 1907. 8vo. *Gift.*

SEAMAN, LOUIS LIVINGSTON. From Tokio through Manchuria with the Japanese. (Illustrations.) New York, D. Appleton & Co. 1905. 8vo. *Gift.*

AUSTRALASIA AND OCEANIA

THOMSON, J. P. British New Guinea. Map, etc. London, George Philip & Son. 1892. 8vo.

POLAR

ARMSTRONG, ALEX. A Personal Narrative of the Discovery of the North-West Passage; . . . Adventure while in search of Expedition under Sir John Franklin. [Map & Frontispiece.] London, Hurst & Blackett. 1857. 8vo.

BERNIER, J. E. Report on the Dominion Government Expedition to Arctic Islands and the Hudson Strait on board the C. G. S. "Arctic" 1906-1907. [Map] (& Illustrations). Ottawa, C. H. Parmelee, Prt. 1909. 8vo.

SCHLEY, WINFIELD S. Report of ——, Commander, U. S. Navy, commanding Greely Relief Expedition of 1884. [Maps, etc.] Washington, Gov't. Print. Office. 1887. sq. 8vo.

GENERAL

RUSSELL, WILLIAM HOWARD. The Prince of Wales' Tour: a Diary in India; with . . . Visits . . . to . . Greece, Egypt, Spain, and Portugal. Illustrations. New York, Lovell, Adam, Wesson & Co. (1877.) 8vo.

SYDOW, E. VON. Schul-Atlas in zwei und vierzig Karten. Gotha, Justus Perthes. 1866. 8vo. *Gift.*

VASSAR, JOHN GUY. Twenty Years Around the World. 4th Edition. [Portrait.] New York, G. W. Dillingham. 1891. 8vo.

WILLIAMS, HENRY T. Editor. Williams' Illustrated Trans-Continental Guide of Travel, from the Atlantic to the Pacific Ocean, etc., etc. New York, Henry T. Williams. 1878. 8vo.